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Archives of PHYSICAL MEDICINE *and* REHABILITATION

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EARL C. ELKINS, M.D.
Rochester, Minn

37th ANNUAL SESSION • MINNEAPOLIS • Aug. 30-Sept. 4, 1959

Archives of Physical Medicine and Rehabilitation

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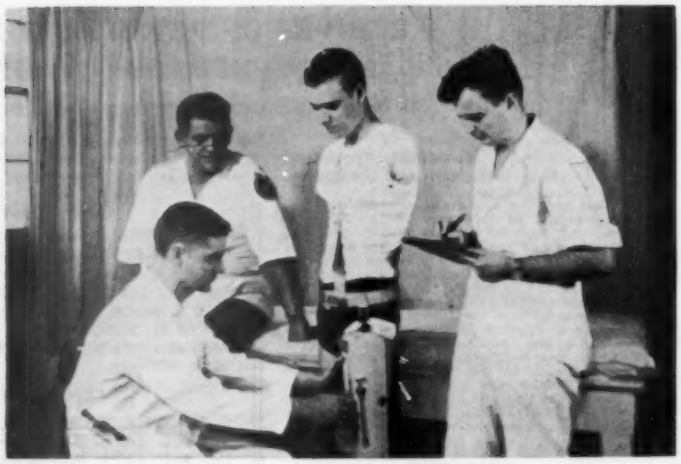

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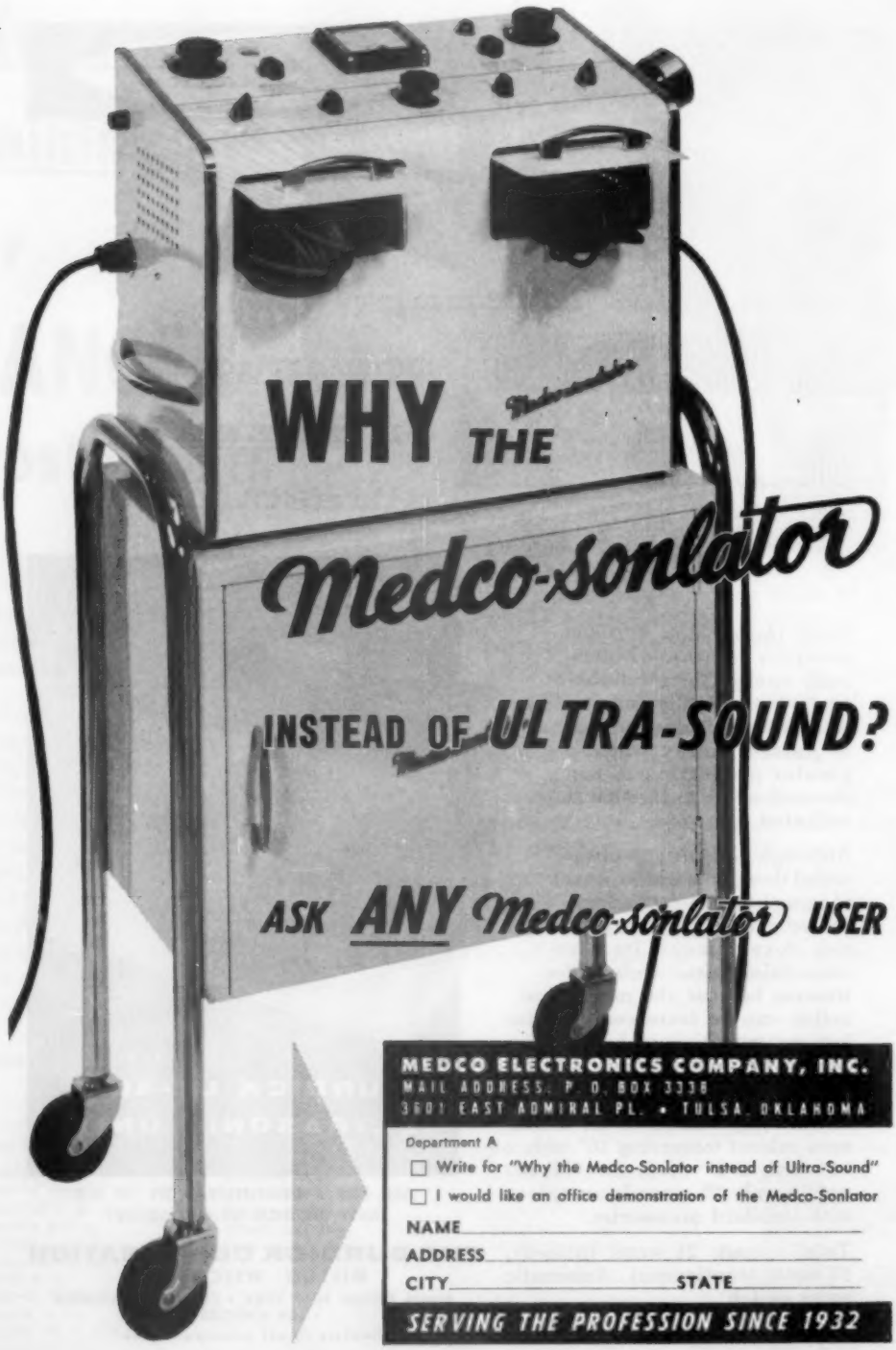

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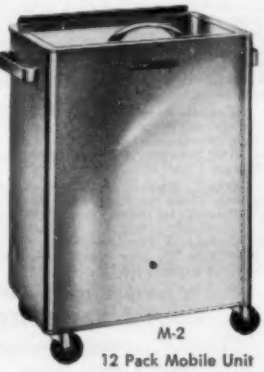

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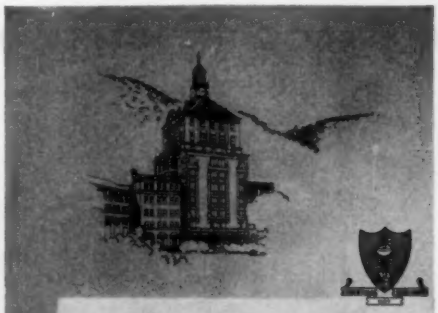

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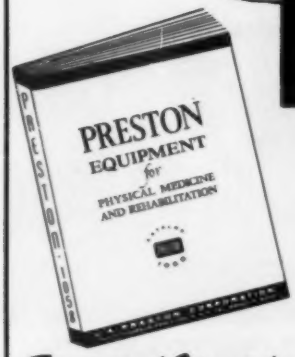

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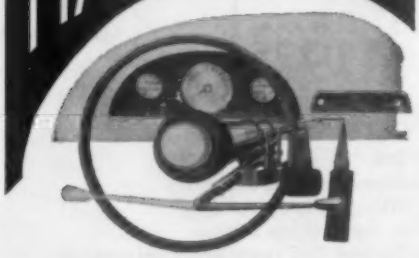

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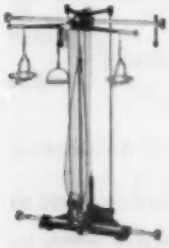

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APMR-11-58

Comparative Study of Antispasmodic Drugs in Patients with Spinal Cord Injuries

Roy H. Nyquist, M.D.
A. Estin Comarr, M.D.
and
Ernest Bors, M.D.
Los Angeles

● This study evaluates the effect of meprobamate on the somatic and autonomic elements involved in spasticity problems and bladder function in patients with spinal cord injuries in comparison to Phenobarbital and zoxazolamine with comments on other treatments used in the past twelve years at a treatment center for spinal cord injuries.

Permanent, complete relief of spasticity has heretofore been accomplished by destructive procedures — anterior rhizotomy, selective myotomies, selective tenotomies, selective neurotomies, and subarachnoid alcohol injections (table 1).

Table 1: Surgical Methods for Permanent Relief of Spasticity, 1946-1957.

Procedure	Patients	Operations
Sutter	5	9
Anterior rhizotomy	26	32
Subarachnoid alcohol blocks	78	95
Obturator neurotomy and adductor myotomy	50	92
Peterson (modified)	5	6
Femoral neurotomy	8	14
Peroneal neurotomy	3	4
Tenotomies	39	67
Intrapelvic obturator neurotomy	3	4

Therefore, the search for nontoxic antispasmodic drugs is still timely. The quest would be easier if all the pathophysiological factors producing spasticity were known. In addition to organic factors there are psychogenic factors which have been described by Hohmann.[1]

Spasticity of varying intensity is associated with nearly every upper motor neuron lesion. Mild degrees of spasticity are an asset in that the involuntary muscle contractions maintain circulation and prevent creatine depletion. Another, psychologically beneficial, effect of mild spasticity is that it contributes to an almost normal physical appearance of the patient, which is his most coveted goal. Increasing spasticity has been treated at this center in the past decade by drugs such as curare, myonesin, and phenobarbital. Additionally, physical medicine treatments have been applied in order to relieve spasticity temporarily, consisting of such methods as Hubbard tank treatments, sinusoidal electrical stimulation, weight bearing by standing, and ambulation.[2] In spite of these procedures, spasticity often progressed and resulting contractures made the previously mentioned surgical procedures necessary.

Some patients show the clonic, others the tonic type of spasticity. Still others display a mixture of the two types. Furthermore, some patients have a greater spasticity of the extensor muscles than of the flexor muscles and vice versa; spasticity of the flexor group is more frequent and troublesome.

A few patients in whom subarachnoid alcohol injection was complicated by residual abdominal clonic spasticity, benefited from phenobarbital. With the advent of newer antispasmodic drugs it appeared desirable to evaluate their effect on somatically and autonomically innervated muscles in patients with spinal cord injuries; the purpose of this study is to report our experience with meprobamate (Equanil) and zoxazolamine (Flexin) in comparison to phenobarbital and placebo.

Read at the Thirty-fifth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Los Angeles, September 10, 1957.

Paraplegia Service, VA Hospital, Long Beach, Calif.; Instructor, Physical Medicine Department, Medical School, University of Southern California; Attending Staff, Los Angeles County Hospital.

Chief, Urology Section, and Assistant Chief, Paraplegia Service, VA Hospital, Long Beach, Calif.; Urology Section, Department of Surgery, School of Medicine, College of Medical Evangelists.

Chief, Paraplegia Service, VA Hospital, Long Beach, Calif.; Associate Clinical Professor of Surgery (Urology), Medical School, University of Southern California.

Material and Methods

Twelve patients were studied, nine had incomplete and three had complete lesions; seven incomplete lesions were cervical and two were thoracic. The three complete lesions were cervical. The duration of injury ranged from 5 to 24 months in 11 patients and was 168 months in 1 patient. The ages of the patients ranged from 22 to 64 years, with seven patients in the third decade, three in the fourth, one in the sixth, and one in the seventh.

Clinically, spasticity was assessed as follows: The first appearance of mild pseudospontaneous spastic reflexes is considered as one plus; the increase in frequency and severity of the spasms is considered as two plus provided that the spasticity responds to treatment, designed to reduce its severity; if a further increase in frequency and intensity of the spasms occurs despite treatment the degree is considered as three plus; if irreversible contractures occur, the degree is considered as four plus.

An 8-channel Grass electromyograph recorder was used for testing the muscles of the lower extremities. Fine 28-gage platinum wire needle electrodes, 1.25 cm. in length, were inserted into the superficial aspects of the quadriceps femoris

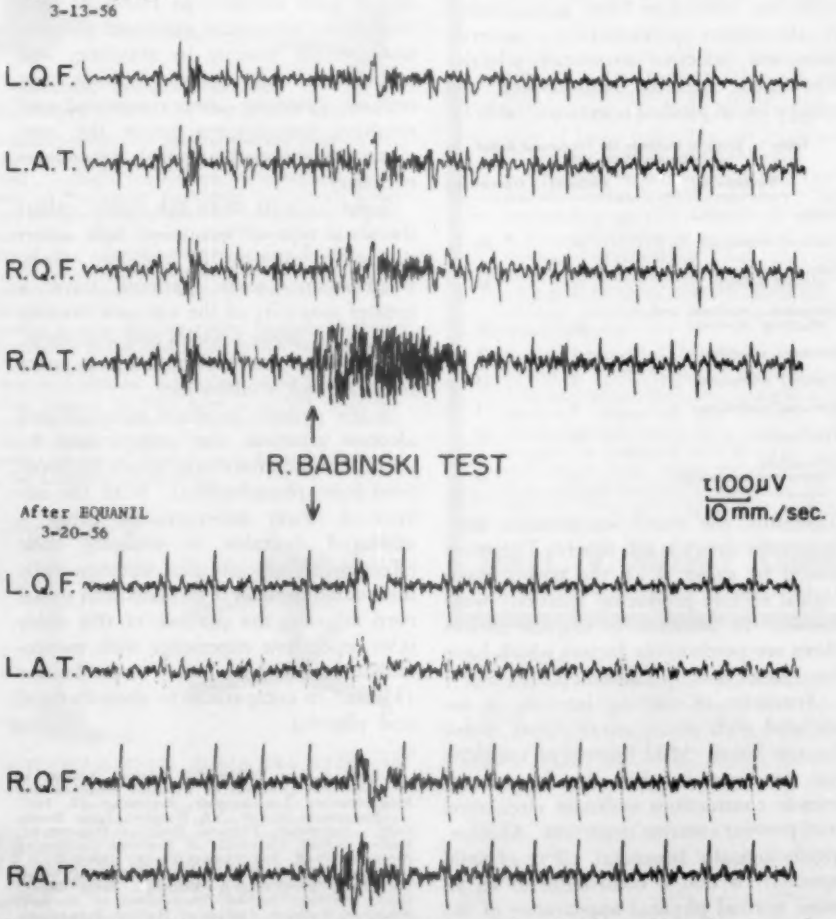

Fig. 1 — Envelope of interference pattern in right anterior tibialis and right quadriceps femoris muscles evoked by Babinski Test on right foot, and crossed-reflex pattern in same muscles on left before and during Equanil therapy.

and anterior tibialis muscles, bilaterally. The patient was tested in the supine position, and stroking of the sole of the foot, as done in performing the Babinski test, was used as a stimulus.[3]

Electromyographically, a baseline at rest was first recorded showing the frequency (number of waves per second), the voltage and duration of the involuntary active motor units, without and with stimulation of the sole of the foot. This was done prior to the administration of Equanil, Flexin, phenobarbital, and placebo tablets. After the patient had been on one of the above drugs for four or five days the tracings were repeated. Since the tracing of the immediate response to stimulation was so dense as to make the counting of individual motor units difficult, the envelope of an interference pattern, that is, an accumulation of muscle discharges, was evaluated in regard to voltage, frequency, and duration. The pattern of the crossed-reflex burst of impulses[2] was evaluated similarly (see figs. 1, 2 and 3).

The tonicity and size of the bladder were studied using a Lewis cystometer. Retrograde cystometry was performed with distilled water at room temperature. An increment was 25 cc. per minute which entered the empty bladder in a continuous flow by means of a whistle tip catheter. The test was terminated when either a detrusor contraction ejected the catheter, or when signs of autonomic hyperreflexia appeared, or when a volume of 400 cc. was reached.

Sphincterometry was performed with an Asepto bulb-syringe connected by an interpolated T-tube, to the cystometer. The instrument measures the resistance of the sphincteric systems of the bladder and urethra to fluid inflow.[4] A cystogram was done before, during, and after Equanil, Flexin, and phenobarbital therapy.

Previous experience with Equanil had shown 400 mg. four times a day to be insufficient and 800 mg. three times a day to be necessary as a therapeutic dose. Before baseline studies were started the patient had had no medication for two weeks. Electromyographic, cystometric, sphincterometric and cystographic studies were made before, during, and upon completion of seven-days treatment with Equanil; the same method was used for studying the effects of phenobarbital (50 mg. three times a day), Flexin (500 mg. four times a day) and "Flexin-placebo" tablets, respectively.

Results

Subjective and objective improvement of somatic spasticity was observed in 11 of the 12 patients with Equanil. Only one patient required peripheral surgical correction of muscular contractures, namely bilateral obturator neurotomies, adductor myotomies, and unilateral psoas myotomy with femoral neurotripsy. That patient still required Equanil for the relief of residual spasticity in muscle groups not attacked by the operations.

Electromyographic results were tabulated (table 2), comparing the findings during Equanil therapy with those before medication. The number of spikes per second was counted 10 seconds after stimulation. One patient showed an increase in spikes, nine patients showed a decrease, and two showed no change. The amplitude, measured in the time from 1 to 10 seconds after stimulation, increased in one patient, decreased in eight, and remained unchanged in three patients. The duration of the burst of impulses following stimulation increased in one patient, decreased in nine, and was unchanged in two patients. The over-all pattern of burst of impulses in regard to spikes, amplitude, and duration, described as an envelope of interference by Bors and Blinn, was decreased in all 12 patients. The pattern of the crossed-reflex bursts of impulses[2] was also decreased in all 12 patients.

The electromyographic results of treatment with Flexin, phenobarbital, and placebo tablets are tabulated in tables 3, 4 and 5 respectively.

Discussion

Equanil (800 mg., three times a day), improved subjectively and objectively the somatic spasticity of 11 patients. The electromyogram demonstrated this to be due to an objective effect on the neuro-

muscular elements. The tracings showed a decrease of spikes per second, amplitude of the waves, and duration of the bursts (table 2), and each of the 12 patients showed a decrease in crossed-reflex response.[2] Two reliable methods of evaluation are the study of (1) the envelope of interference pattern, and (2) the

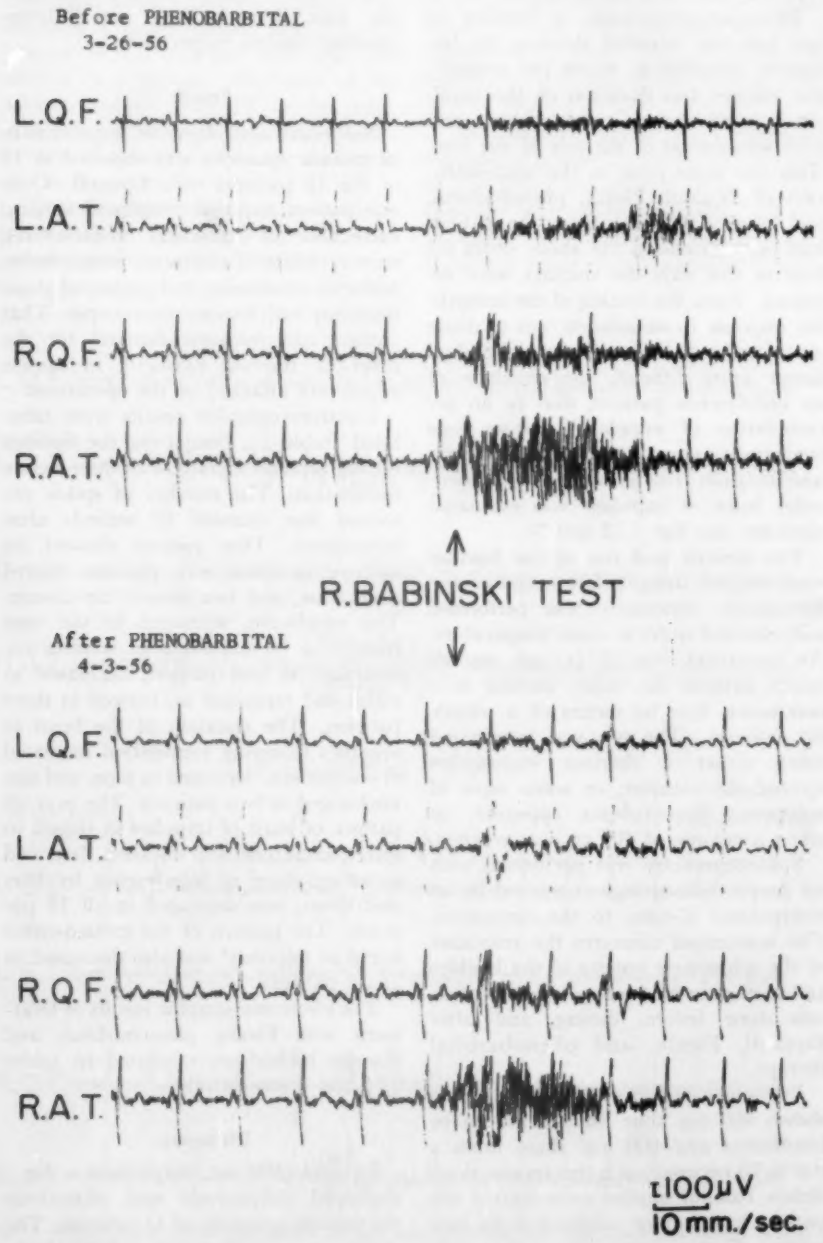

Fig. 2 — Envelope of interference pattern in right anterior tibialis and right quadriceps femoris muscles and crossed-reflex pattern in same muscles on left before and during phenobarbital therapy.

decrease in the crossed-reflex pattern; this obviates the cumbersome counting of spikes, amplitude, or duration of the bursts.

The evaluation of the drug effect on bladder function or urinary excretion was equivocal. Fifty per cent of the Equanil group showed greater residual urines, and an increase in sphincterometric resistance. Yet, of eight patients who had indwelling intraurethral catheters at the start of medication, three became catheter-free during Equanil therapy whereas five still retained their catheters. This beneficial effect may be explained on the basis of reduced facili-

Table 2: Statistics of Electromyographic Examinations during Equanil Therapy.

Patient No.	Neurological Level	Complete	Incomplete	Months Since Injury	Degree of Spasticity	Spikes per Second			Amplitude of Waves			Duration of Burst			Envelope of Interference			Crossed-Reflex Pattern		
						+	−	U	+	−	U	+	−	U	+	−	U	+	−	U
1	C3-4		x	9	3-4	x				x		x			x			x		
2	C4		x	23	3		x		x			x			x			x		
3	C4		x	168	2-3	x				x		x			x			x		
4	C5		x	12	2-3	x			x			x			x			x		
5	C5		x	11	3-4	x			x			x			x			x		
6	C5		x	19	2	x			x			x			x			x		
7	C5-6-7	x		20	3	x			x			x			x			x		
8	C6-7	x		20	2-3	x			x			x			x			x		
9	C6-7	x		9	3		x		x				x		x			x		
10	C7		x	5	3	x				x			x		x			x		
11	T4		x	18	3	x			x			x			x			x		
12	T12		x	24	2	x			x			x			x			x		
					Totals	1	9	2	1	8	3	1	9	2	0	12	0	0	12	0

+ = Increase; − = Decrease; U = Unchanged.

Table 3: Statistics of Electromyographic Examinations during Flexin Therapy.

Patient No.	Neurological Level	Complete	Incomplete	Months Since Injury	Degree of Spasticity	Spikes per Second			Amplitude of Waves			Duration of Burst			Envelope of Interference			Crossed-Reflex Pattern		
						+	−	U	+	−	U	+	−	U	+	−	U	+	−	U
1	C3-4		x	9	3-4	Not tested. Procaine blocks.														
2	C4		x	23	3	Not tested. Attacks of paroxysmal hypertension and hexamethonium treatment.														
3	C4		x	168	2-3	x				x		x			x			x		
4	C5		x	12	2-3	Not tested. Intermittent fever.														
5	C5		x	11	3-4		x			x		x			x			x		
6	C5		x	19	2			x	x			x			x			x		
7	C5-6-7	x		20	3	x				x			x			x			x	
8	C6-7	x		20	2-3		x			x			x			x			x	
9	C6-7	x		9	3	x				x			x			x			x	
10	C7		x	5	3	x				x			x			x			x	
11	T4		x	18	3	Not tested. Tenderness over laminectomy.														
12	T12		x	24	2	Not tested. Gastrointestinal symptoms.														
					Totals	4	2	1	4	3	0	2	5	0	2	5	0	2	5	0

+ = Increase; − = Decrease; U = Unchanged.

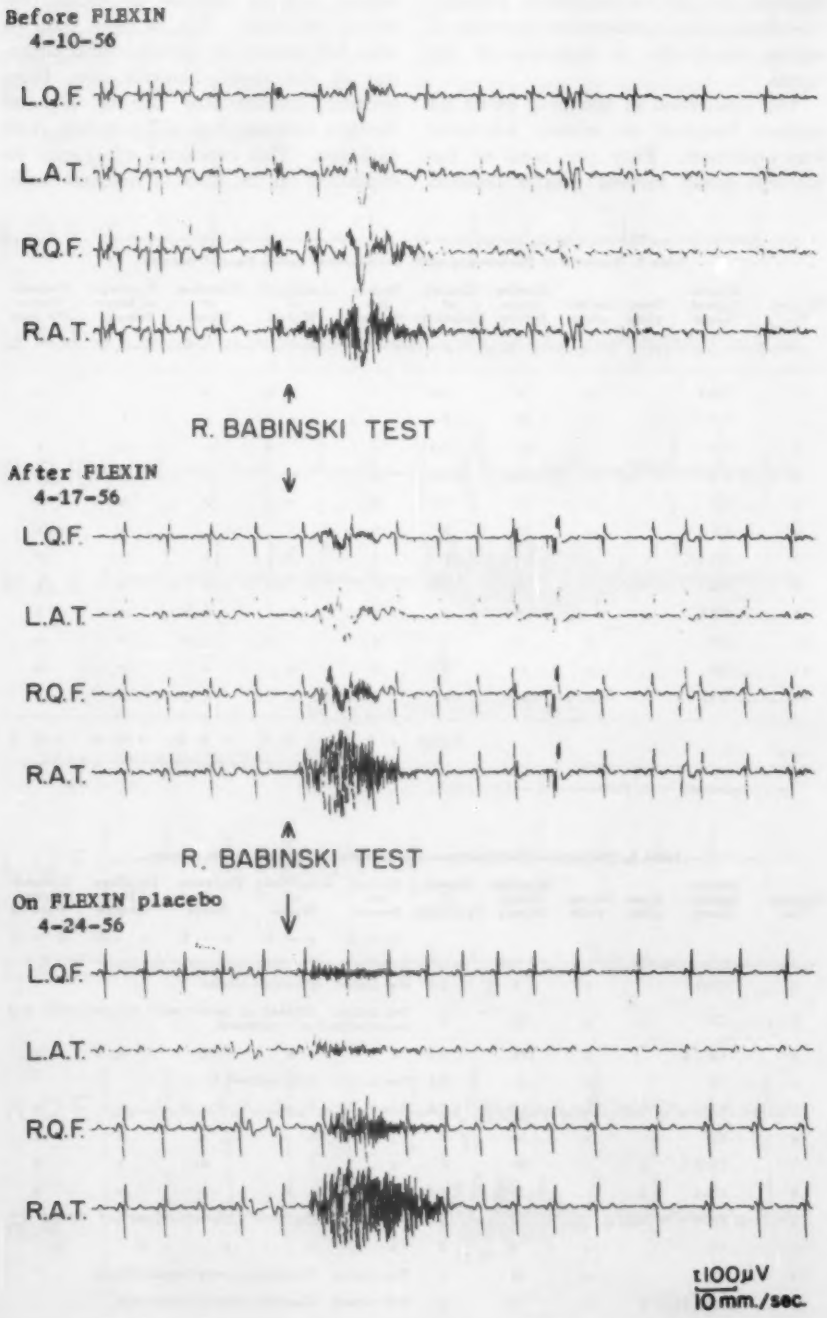

Fig. 3 — Envelope of interference pattern and crossed-reflex pattern evoked by Babinski Test before and during Flexin therapy and during treatment with "Flexin placebo" tablets.

Table 4: Statistics of Electromyographic Examinations during Phenobarbital Therapy.

Patient No.	Neurological Level	Complete	Incomplete	Months Since Injury	Degree of Spasticity	Spikes per Second			Amplitude of Waves			Duration of Burst			Envelope of Interference			Crossed-Reflex Pattern		
						+	−	U	+	−	U	+	−	U	+	−	U	+	−	U
1	.....C3-4		x	9	3-4			Not tested.			Procaine blocks.									
2	.....C4		x	23	3		x			x			x			x			x	
3	.....C4		x	168	2-3	x					x	x			x					x
4	.....C5		x	12	2-3			Not tested.			Intermittent fever.									
5	.....C5		x	11	3-4		x			x			x			x			x	
6	.....C5		x	19	2		x			x			x			x			x	
7	.....C5-6-7	x		20	3		x			x			x			x			x	
8	.....C6-7	x		20	2-3		x			x			x			x			x	
9	.....C6-7	x		9	3	x				x			x			x			x	
10	.....C7		x	5	3		x			x			x			x			x	
11	.....T4		x	18	3			Not tested.			Tenderness over laminectomy.									
12	.....T12		x	24	2			Not tested.			Gastrointestinal symptoms.									
					Totals	2	6	0	0	7	1	1	7	0	1	7	0	0	7	1

+ = Increase; − = Decrease; U = Unchanged.

Table 5: Statistics of Electromyographic Examinations during "Flexin-Placebo" Therapy.

Patient No.	Neurological Level	Complete	Incomplete	Months Since Injury	Degree of Spasticity	Spikes per Second			Amplitude of Waves			Duration of Burst			Envelope of Interference			Crossed-Reflex Pattern		
						+	−	U	+	−	U	+	−	U	+	−	U	+	−	U
1	.....C3-4		x	9	3-4			Not tested.			Procaine blocks.									
2	.....C4		x	23	3			Not tested.			Paroxysmal hypertension.									
3	.....C4		x	168	2-3		x		x			x			x			x		
4	.....C5		x	12	2-3			Not tested.			Intermittent fever.									
5	.....C5		x	11	3-4		x				x	x			x			x		
6	.....C5		x	19	2	x				x		x					x	x		
7	.....C5-6-7	x		20	3	x				x		x				x		x		
8	.....C6-7	x		20	2-3		x		x			x			x			x		
9	.....C6-7	x		9	3		x		x					x		x		x		
10	.....C7		x	5	3	x				x			x			x				x
11	.....T4		x	18	3			Not tested.			Tenderness over laminectomy.									
12	.....T12		x	24	2			Not tested.			Gastrointestinal symptoms.									
					Totals	3	3	1	3	3	1	5	1	1	3	3	1	6	1	0

+ = Increase; − = Decrease; U = Unchanged.

Table 6: Comparative Effect of Drugs on Bladder.

Drug	No. Patients	Amount Voided			Residual			Capacity			Basic Tone			Sphincteric Resistance			Vesical Neck	
		+	−	U	+	−	U	+	−	U	+	−	U	+	−	U	Open	Unchanged
Equanil	12	3	4	5	6	3	3	2	4	6	4	4	4	6	5	1	1	11
Phenobarbital	7	4	1	2	3	1	3	5	0	2	4	1	2	4	3	0	2	5
Flexin	6	1	3	2	2	1	3	3	1	2	2	2	2	1	4	1	1	5

+ = Increased; − = Decreased; U = Unchanged.

tation of the striated pelvic floor musculature, known also to follow in the wake of other procedures, such as obturator neurotomy and adductor myotomy. The discrepancy of the cystometric and clinical findings may have been resolved if the more physiologic method of excretory cystometry[5] had been used rather than retrograde cystometry.

It should be stressed that Equanil did not interfere with the established and balanced bladder function of four patients who remained catheter-free during therapy. The same applies to Flexin and phenobarbital, which did not alter bladder function; but while none of the functioning bladders regressed during therapy, none of the bladders started to function. The same discrepancy between cystometric and clinical findings was observed as with Equanil.

Therefore, all three drugs can be used for treating spasticity without detriment to bladder function. Equanil should be started at 400 mg., three times a day, and increased up to 800 mg., three times a day, if necessary. No untoward complications have been observed on our many patients.

Equanil has a double action: a selective tranquilizing effect on the thalamus and a blocking effect on spinal interneurons.[6] While the proximal cord stump is affected by both, the tranquilizing supraspinal action and the blocking action of the spinal interneurons, the distal stump receives only that benefit of the drug which results from interneuronal block. However, areas of the body above and below the cord lesion are still connected by skin, muscles, and fasciae which transmit proprioceptive stimuli to parts deprived of supraspinal regulation. Therefore, Equanil acts directly on the thalamus, the interneurons of the upper and lower cord segments, and indirectly on the distal stump by reducing the feedback, from the proximal to the distal cord stump, which depends on the transmission of cerebral impulses, bypassing the spinal cord lesion. Inasmuch as emotion and stress are also sources of spasticity, they are reduced by the tranquilizing effect of the drug.

Our studies suggest that phenobarbital acts as a blocking agent on spinal cord interneurons. Phenobarbital has long been known as an anticonvulsant. It depresses the motor cortex, circulation, and respiration, and has sedative and hypnotic properties. This drug, too, would therefore act on supraspinal stations (cerebrum, brain stem, and medulla oblongata) and possibly as a blocking agent on the spinal cord interneurons. We propose this only as a working hypothesis which would need neuropharmacologic confirmation.

Flexin appears to have only a single action, to prevent or relieve skeletal muscle spasm by depression of central (spinal) polysynaptic pathways and is therefore less effective than Equanil or phenobarbital.

Our observations following the administration of placebo tablets would indicate that, in this series of patients, emotion and stress played a minor role in the production of spasticity.

Equanil in comparison to phenobarbital improves sleep slightly better and does not make the patient drowsy the next day. The drowsy, sedative-like feeling which phenobarbital produces is not liked by some patients.

Other findings during the Equanil study were as follows: sleep improved in 11 patients and remained unchanged in one; daytime drowsiness occurred in seven patients, but not in the remaining five; mental acuity appeared to be decreased in only one patient; bowel habit was unchanged in 11 patients, but constipation occurred in one; pain, associated with spasticity and its pull on normally innervated areas improved in four patients. Two patients with incomplete lesions and lack of voluntary movement in the lower extremities, due to masking by spasticity, had improved voluntary control. However, in one of these (table 2, patient 3) the upper extremities became weaker. One patient (table 2, patient 9) showed improvement of voluntary control in the upper extremities following Equanil therapy.

The decrease of the envelope of interference pattern and the crossed-reflex

pattern has been mentioned (table 2). The effect of phenobarbital came closest to that of Equanil in that seven of the eight patients showed a decrease in both the envelope of interference pattern and the crossed-reflex pattern (table 4). The Flexin effect was inferior to the phenobarbital action and only five of the seven patients showed a decrease in the envelope of interference pattern and in the crossed-reflex pattern (table 3).

When the latter seven patients were treated with placebo tablets, the envelope of interference pattern and the crossed-reflex pattern decreased in one patient, but the envelope of interference pattern increased in three patients, and the crossed-reflex pattern increased in six patients (table 5). Thus, the results of the placebo therapy suggest that an emotional factor was involved, confirming Hohmann's original findings. Emotion and stress inhibit reflex activity through the production of adrenergic substances inhibiting reflex activity, and a counterbalancing of the autonomic nervous system follows with the formation of cholinergic substances which enhance reflex activity.

Whereas Equanil and phenobarbital were free from untoward reactions, Flexin caused skin efflorescences in one patient.

The electromyographic tracings demonstrate the efficiency of the antispasmodic drugs in the following order: (1) Equanil, (2) phenobarbital, (3) Flexin, (4) placebo. Clinical observations followed the same rating.

Summary

Equanil is the drug of our choice for relief of spasticity. Phenobarbital is a valuable substitute. These drugs do not substitute for myotomies, tenotomies, neurotomies, rhizotomies, or subarachnoid alcohol injections for extreme spasticity with contractures. These drugs do not interfere with bladder rehabilitation.

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Important Announcement —

The next examinations of the American Board of Physical Medicine and Rehabilitation will be held in Philadelphia, Pennsylvania, June 12 and 13, 1959. The final date for filing application is February 15, 1959. Write to the Secretary, Dr. Earl C. Elkins, 200 First Street S. W., Rochester, Minnesota, for application form.

Influence of Surgical Metal Implants on the Temperature Distribution in Thigh Specimens Exposed to Ultrasound

Justus F. Lehmann, M.D.
George D. Brunner
and
Jo Ann McMillan
Seattle

● Measurements of temperature distribution curves in the thigh specimen with and without surgical metal implants have demonstrated that the presence of the metal implant does not lead to any appreciable rise of temperature in front of the metal. The thermal conductivities of metals and of the surrounding tissues were compared. Data suggest that it might be possible to use ultrasound as a means for deep heating of tissues in spite of the presence of the metallic surgical implants. Further studies in live animals must be done before application to human beings can be safely considered.

The acoustic properties of metals used for surgical implants have been previously compared with those of tissues. It was found that there is a considerable mismatch of impedance which leads to reflection at the interface between the tissue and the metal implant.[1] The pattern of scattering or focusing of ultrasonic energy which was dependent upon the geometry of the implants was demonstrated. In some cases an appreciable increase of ultrasonic intensity was observed in focal areas. The purpose of the following study was to investigate whether or not a local increase in ultrasonic intensity resulting from the reflection at the metal surfaces also produced a significant increase in temperature.

Methods

The temperature distribution along the axis of the ultrasonic beam was measured in thigh specimens with methods previously described.[2] Pig thighs were used since only in this animal is the ratio of skin, fat, muscle and bone similar to that of the human. The specimens were inserted into the far field of the ultrasonic beam where the distribution of intensity was rather uniform. The metal implants were inserted into the specimens in the same fashion as under surgical conditions with the one exception that an effort was made to preserve the soft tissue structures traversed by the ultrasonic beam.

Experiments

It was previously found[1] that metal bone plates reflected ultrasonic energy with a resulting twofold increase in ultrasonic intensity in front of the plate. In order to determine whether this increase in intensity also led to a corresponding increase in temperature, the distribution of temperature along the axis of the sound beam was measured in seven pig thighs with a Thornton side plate inserted into each one. As a result of the reflection the temperature decline was delayed in the area just in front of the metal plate. An example is shown in figure 1. However, the temperature in this area was never higher than that measured in the more superficial muscle layers. In other words, a selective rise of temperature was never observed in the area in front of the metal plate. In addition, this type of experiment was performed three times with a comparatively thin (3 to 5 cm.) layer of musculature in front of the bone plate. The results were essentially the same. No selective rise of temperature occurred in front of the metal plate.

All curves described above were similar to those obtained previously in the thigh specimen without metal implants.[2] These temperature distribution curves also exhibited an irregularity in front of the bone, which was largely due to the reflection which occurred at the interface between muscle and bone. There-

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The authors are indebted to Mr. Vilas Johnston for his technical assistance.

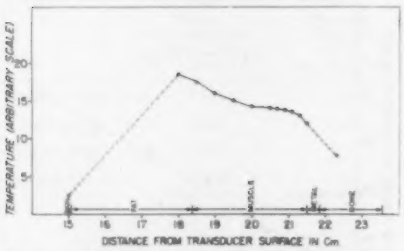

Fig. 1 — Temperature distribution in thigh specimen, with a Thornton side plate inserted in front of the bone.

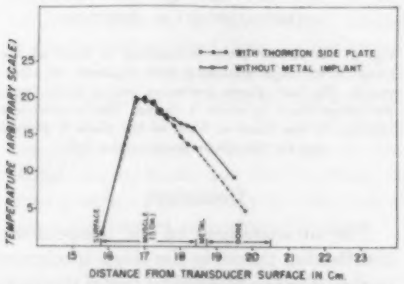

Fig. 2 — Temperature distribution in a specimen consisting of muscle and bone with and without a Thornton side plate inserted in front of the bone.

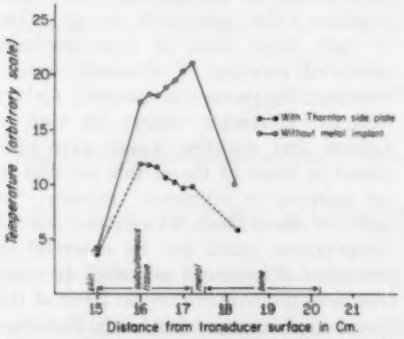

Fig. 3 — Temperature distribution in a specimen consisting of skin, subcutaneous tissues and bone, with and without a Thornton side plate inserted in front of the bone.

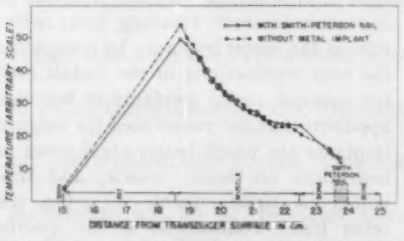

Fig. 4 — Temperature distribution in a thigh specimen, with and without insertion of a Smith-Peterson nail.

fore, the question arose as to whether or not there was a difference between the temperature distribution curve in the specimen with the metal implant and the temperature distribution curve in the specimen without the metal implant.

In another series of seven experiments specimens were exposed to ultrasound, once with the bone plate inserted and once without. The temperature distribution was measured each time. In all of these experiments it was found that the temperature just in front of the metal implant was slightly lower than the temperature measured in the same area in the absence of the metal implant. An example is given in figure 2.

A series of four experiments was conducted with skin and subcutaneous tissues approximately 2 cm. thick in front of the bone. Again the temperature distribution curve was measured in each specimen, once with the bone plate inserted and once without. The peak of the temperature distribution curve was always found in the tissues just in front of the bone. The temperature was found to be lower and the temperature peak was less pronounced in the tissues with the metal plate inserted in front of the bone. An example is given in figure 3.

In another series of eight experiments a Smith-Peterson nail was inserted into the bone of complete thigh specimens. The sound beam was incident at the angle between the two flanges of the Smith-Peterson nail. Previous measurements had shown that in this area the ultrasonic intensity is increased 2.7 fold as a result of reflection. In spite of the increase in intensity in this area no appreciable rise of temperature was noticed (fig. 4).

Identical experiments were performed seven times with the Smith-Peterson nail inserted into the bone in such a fashion that one flange pointed at the ultrasonic applicator surface. The sound beam was incident at the flange. It was previously found[1] that under these circumstances focal areas of increased intensity occur at either side of the flange. The temperature distribution curves as determined in the thigh specimen with and

without the nail inserted in this fashion showed no significant change.

In another series of experiments a Küntscher nail was inserted into the bone of the thigh specimen. The ultrasonic beam was incident at the groove of the nail. It was found previously[1] that under these conditions the ultrasonic intensity was increased 3.7 times in the groove of the nail. When the temperature distribution curve in each thigh specimen was determined with and without the nail inserted into the bone, a significant or consistently higher rise of temperature was not found in the presence of the nail. This includes the temperatures measured inside the nail in the focal area.

Each of the following experiments was performed four times with the bone exposed without any overlying tissues: (1) sound beam incident at the angle of two flanges of a Smith-Peterson nail; (2) sound beam incident at one flange of a Smith-Peterson nail with the flange pointing at the sound applicator surface; and (3) sound beam incident at the groove of the Küntscher nail. The temperature in the bone was demonstrated to be lower in the presence of the metallic implant.

Corresponding experiments with vitallium implants gave essentially the same results. Experiments with hip cups were not performed since it is impossible to irradiate such cups so that the ultrasound beam is incident perpendicularly at the opening of the cup. Appreciable focusing of ultrasonic energy occurs only when the beam is so incident.

The following experiment shows that heat conduction may play a role in modifying the temperature in front of a metal implant exposed to ultrasound in a thigh specimen. The plate of a Jewett nail (nail + plate being one piece of metal) was exposed to ultrasound inside the specimen. The nail itself protruded into a separate water bath, the temperature of which varied. The temperature was measured in the thigh specimen in front of the plate. Figure 5 shows the influence of the temperature of the nail on the temperature rise in tissues in front of the plate.

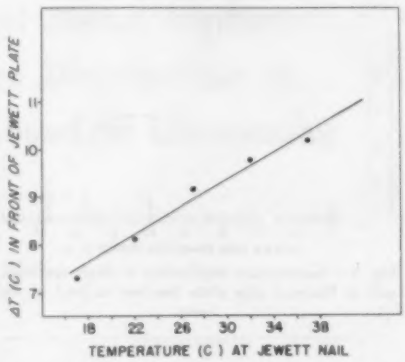

Fig. 5 — A Jewett plate is inserted in front of the bone in a thigh specimen and exposed to ultrasound. The nail above protrudes into a water bath, the temperature of which is varied. The temperature increase in the tissue in front of the plate is plotted against the temperature of the nail.

Discussion

The measurement of the temperature distribution curves in the thigh specimens in the presence of surgical metal implants did not show any appreciable rise of temperature in front of the metal implant in spite of the fact that these metal implants reflect ultrasonic energy. Due to their shape some of these implants produced focusing of ultrasonic energy with resulting increase in intensity. Others reflected ultrasonic energy in such a fashion that standing waves were produced in front of them; this led also to an increase in ultrasonic intensity. In spite of these facts a selective rise of temperature could not be observed in the areas of increased intensity. In some instances the temperature in front of the metal implant was even lower than that observed in the same area of the specimen without the metal implant.

These results suggest that other factors have compensated for the increase in ultrasonic intensity resulting from reflection at the metal implant. In comparing the heat conductivity of the metals used for surgical metal implants it becomes apparent that the metals used for surgical implants are much better conductors of heat than are bone, muscle, and subcutaneous tissues (table 1). On the other hand, comparison of the specific heat of the metals with that of the surrounding tissues shows that it is some-

Table 1

	Thermal Conductivity Cal. x Cm. / Cm.² x Sec. x °C.	Specific Heat at 20 C. Cal./Gm./°C.
Stainless steel	0.039	0.12
Titanium	0.036	0.13
Muscle (pig)	0.0012	0.75
Bone (pig)	0.0035 (whole bone)	0.323 (cortical bone)
		0.504 (cancellous bone)

what easier to heat the metals than the tissues; however, the difference in the heat conductivity of metals and tissues is much more marked than the difference in the specific heat of metals and tissues. These figures tend to support the assumption that the increase in heat loss due to the high thermal conductivity of the metal compensates for the increase in heat generated as a result of reflection of ultrasonic energy at the metal implant.

Summary

Measurements of temperature distribution curves in the thigh specimen with and without surgical metal implants have demonstrated that the presence of the metal implant does not lead to any appreciable rise of temperature in front of the metal. The thermal conductivities of metals and of the surrounding tissues were compared. It was found that the metals are much better heat conductors than the tissues. The high thermal conductivity of the metals compensates for the rise of temperature in front of the metal implant which might result from reflection at the metal surface. These data suggest that it might be possible to use ultrasound as a means for deep heating of tissues in spite of the presence of the metallic surgical implants. Further studies in live animals must be done before application to human beings can be safely considered.

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A Device for the Application of Heavy Lumbar Traction: Its Mechanical Effects

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and
George D. Brunner, B.S.
Seattle

● A hydraulic device delivering heavy lumbar traction in an upright position has been described. The advantage of this design is that a smooth and fast release of the traction can be obtained. Under traction the proper alignment of the vertebrae of the lumbar spine is maintained. The machine produced a statistically significant widening of the intervertebral spaces and a therapeutic stretch of the lumbar musculature. Further controlled statistical studies will be necessary to investigate the question of the therapeutic efficacy of this method of traction.

Heavy upright cervical traction applied with Sayre's head sling manually or with mechanical devices has been used extensively by many with satisfactory results.[1-5] It is generally agreed that the therapeutic effects are largely due to the stretching of the musculature and the widening of the intervertebral spaces with resulting relief of nerve root compression. In spite of the fact that these mechanical effects do not last much longer than the treatment itself, therapeutic results are apparently of a longer duration.

These observations have encouraged further search for an adequate lumbar traction device which could produce comparable therapeutic results. Recently interest in heavy lumbar traction was stimulated by Judovich's investigations.[6-8] Judovich and his associates demonstrated experimentally that traction applied in bed by Buck's extension, or similar methods, is counteracted by the friction of the lower part of the body against the bed sheet. Thus, this type of traction does not apply any stretch to the musculature nor does it produce widening of the intervertebral spaces. The therapeutic effects of this type of traction are, in Judovich's opinion, due mainly to the immobilization of the patient in bed. Judovich found that 26 per cent of the total body weight was required to overcome the surface resistance of the lower body segment. This force is completely neutralized and is lost as a stretch force to the lumbar spine. In conclusion, this force had to be overcome by application of heavier traction[9-11] or by eliminating the friction between the lower body segment and the bed. Judovich avoided this problem by using a split traction table.

Frazer[12] used a device where the traction was applied with the patient in an upright position.

To our knowledge, no information is available on the alignment of the vertebrae when traction is applied with the described tables or the upright trunk traction device, nor have quantitative or statistical data been published on the amount of lumbar traction necessary to produce a significant widening of the intervertebral spaces. Only Neuwirth and associates[9, 13, 14] stated that widening of the intervertebral spaces occurred at approximately 200 pounds of traction. Also the period of time required to produce a therapeutic result has not been investigated. The experiences with the cervical traction suggest that therapeutic results may be obtained with heavy traction of a short duration.

A mechanical manipulation device was extensively studied by Wyss and associates.[15, 16] The basic principle of this device is that by flexing the body the posterior aspects of the intervertebral spaces are widened. Unfortunately the published data do not indicate whether or not the anterior portion of the intervertebral spaces is also widened. X-ray pictures rather suggest a narrowing of this area. Therefore it seems to be debatable whether or not this manipulation occurs under traction.

The preliminary therapeutic results obtained with these traction devices are encouraging; however, the methods used to apply lumbar traction are still far from perfect.

It seemed worthwhile to search for a traction device which could apply traction efficiently and smoothly, deliver an

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amount of traction sufficient to produce a definite widening of the intervertebral spaces and the intervertebral foramina, and at the same time stretch the musculature. It was of further interest to investigate the alignment of the vertebrae under this type of heavy traction, as well as to study and eliminate undesirable side effects. Finally, the therapeutic efficacy of such a device had to be assessed.

Methods

An upright heavy lumbar traction device was developed in such a fashion that short-term heavy traction could be easily applied to the patient. This was done in the hope that the therapeutic results might last considerably longer than the mechanical effects of the traction.

A chest harness was designed similar to that described by Frazer. This harness stabilizes the upper part of the trunk. The weight is borne partially by the chest and partially by the arms. The chest harness of slightly conical shape wedges the upper trunk into the support. Arm shelves are attached to this part of the harness to permit partial weight bearing on the arms. The harness is suspended from an overhead spreader-bar by four leather straps, two on each side. By adjusting the length of the medial straps, it is possible to tilt the sides of the harness in or out. If the sides of the harness are tilted inward, more weight is borne by the chest, less by the arms. If the sides are tilted outward, more weight is borne by the arms, less by the chest. Thus it is possible to regulate the weight distribution (see accompanying photograph).

The stabilizing pelvic belt was made of molded leather attached to the bottom of the framework of the traction machine by straps. The traction was applied through an overhead pulley by a hydraulic device* with a modified timing circuit. The amount of traction was measured by a scale inserted between the pulley and the traction machine. More than 400 pounds of true traction could be easily delivered. The weight of the upper half of the body had to be subtracted from the total traction registered at the scale to give the amount of true traction applied to the lumbar area. Judovich has estimated the weight of the upper part of the body to be 52 per cent of the total body weight. The hydraulic mechanism of this machine permitted a fast, smooth build-up and release of the traction, each within 30 seconds.

The volunteers for this study were physical therapy students 18 to 30 years of age, weighing approximately 110 to 170 pounds.

Experiments

First, it was necessary to determine the amount of traction required to produce a significant widening of the intervertebral spaces. In a series of 19 volunteers, traction of 100, 200 and 300 pounds

*Hausted Traction Aid; courtesy of Hausted Manufacturers, Medina, Ohio.

was applied to each individual. It was observed that traction of more than 300 pounds produced an uncomfortable stretch in most of the volunteers. X-rays were taken at rest, before and during traction. It was found that a significant widening of the intervertebral spaces occurred at traction of 200 to 300 pounds. A marked posterior slipping of the fifth lumbar vertebra on the sacrum was noted. This slippage was rectified by moving the straps connecting the pelvic belt to the bottom of the framework of the machine from a lateral attachment to a posterior attachment on the pelvic belt. Thus, any increase in traction produced an increase in the forward tilt of the pelvis, adequately compensating for any change in the alignment of the vertebrae.

Statistical Evaluation

Another series of 19 volunteers was treated with traction of 300 pounds applied for 5 minutes. X-rays were taken at rest, during traction, and 30 minutes after traction. The x-ray beam was centered on the lumbosacral interspace. The distance between two vertebrae, that is, the width of the intervertebral space, was measured. Lines were drawn through the bottom of the vertebra above and through the top of the vertebra below. The distance between the two lines was measured in the center of the interspace. In addition, measurements were taken of the width of the intervertebral space anteriorly and posteriorly. A lead scale was photographed with this area of the lumbar spine to make it possible to compensate for distortion. The results of these studies are summarized in table 1. It was found that the increase in the height of the intervertebral spaces under traction was significant. The statistical significance of the increase of the intervertebral spaces was based on a likelihood of 99.73 per cent (3 sigma equivalent). However, 30 minutes after traction no statistically significant increase in the height of the intervertebral spaces could be found. It was also noted that the widening posteriorly was statistically significant, whereas the widening anteriorly, even if marked, was significant only within a likelihood of 95.46 per cent (2 sigma equivalent).

Table 1: Intervertebral Space

	L_5-S_1	L_4-L_5	L_3-L_4
Rest	10.1 mm. $\sigma = \pm 1.7$	10.6 mm. $\sigma = \pm 1.2$	9.0 mm. $\sigma = \pm 1.0$
Traction 300 lbs.	12.7 mm. $\sigma = \pm 2.2$	12.1 mm. $\sigma = \pm 1.4$	10.3 mm. $\sigma = \pm 0.8$
30 Minutes after traction	10.8 mm. $\sigma = \pm 2.2$	10.5 mm. $\sigma = \pm 2.2$	9.4 mm. $\sigma = \pm 0.9$

It was concluded from these experiments that traction of this type produced not only an efficient stretch of the lumbar musculature, but also a significant widening of the intervertebral spaces. This widening occurred mainly between the posterior aspects of the vertebrae, but was also present anteriorly. It was also noted that mechanical effects of such traction could not be demonstrated much longer than 30 minutes after traction.

Side Effects

More than half of our volunteers felt an uncomfortable stretch in the lumbar area at traction levels between 300 and 400 pounds. However, this discomfort disappeared soon after the traction was released and none of the volunteers complained of any discomfort after 24 hours.

The most difficult complication was that some obese persons exhibited a tendency to faint under heavy traction of this type. This was partially explained on the basis of the pressure applied to the chest and abdomen by the harness and the pelvic belt; this, in turn, probably decreased the venous return and made breathing difficult. However, none of our volunteers or patients actually fainted since the hydraulic device permitted smooth and fast release of the heavy traction.

Preliminary Clinical Experience

To obtain a preliminary impression of the therapeutic value of this traction device, a selective series of patients was treated.

Ten patients with a diagnosis of a degenerative fifth lumbar-first sacral intervertebral disc received 5 to 11 treatments, each extending 5 to 15 minutes with traction up to 300 pounds applied intermittently as tolerated. The diagnosis was based on clinical examination, in addition to the positive x-ray findings. All patients had objective signs of backache before treatment was started. All patients were on bed rest and received physical therapy in the form of radiant heat and massage. Five patients out of this series had lost part or all of the objective signs of backache after the treatments, while the other five still had the objective signs. All 10 patients improved subjectively.

A series of seven patients with the diagnosis of acute protruded intervertebral disc syndrome, with objective signs of backache, including definite neurologic findings, was treated. The patients were on bed rest and received radiant heat and massage treatments. In six out of these seven patients, some or all of the objective signs of backache disappeared after receiving between 3 and 20 treatments. Only one patient did not show any change in the objective signs of backache. Subjectively all patients benefited, at least partially.

Summary

A hydraulic device delivering heavy lumbar traction in an upright position has been described. The advantage of this design is that a smooth and fast release of the traction can be obtained. Under traction the proper alignment of the vertebrae of the lumbar spine is maintained. The machine produced a statistically significant widening of the intervertebral spaces and a therapeutic stretch of the lumbar musculature.

Preliminary results obtained in patients with degenerative lumbosacral disc or an acute protruded fifth lumbar-first sacral intervertebral disc syndrome seem to encourage further clinical investigations. However, these results by no means prove that this apparatus is superior to other traction methods, nor does this study statistically indicate that a definite therapeutic effect has been obtained. Further controlled statistical studies will be necessary to investigate the question of the therapeutic efficacy of this method of traction.

Acknowledgments: This investigation was stimulated by personal experience of one of the authors with traction devices as used by Doctors Frank H. Krusen and Earl C. Elkins of the Mayo Clinic. We are grateful to Doctors Krusen and Elkins for their advice.

The experimental part of this investigation was evaluated at the Division of Physical Medicine and Rehabilitation, College of Medicine, Ohio State University at Columbus. We are grateful to Miss Gladys Woods, Mr. Bernard Strohm and Mr. Henri Guyette for their assistance.

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MINNEAPOLIS for the ANNUAL SESSION,

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Heat Pyrexia Following a Hydrotherapeutic Procedure

Walter E. Marchand, M.D.
Bedford, Mass.

● A case of heat pyrexia following a sedative bath with the temperature of the water between 95 and 97 F. is presented. The need for taking rectal temperatures and instituting such treatment only if the rectal temperature is found normal is stressed.

Hydrotherapy in the form of the sedative bath, with water temperatures between 92 and 97 F., is frequently used in the treatment of the disturbed psychotic patient. The potential dangers of such sedative baths are fully appreciated by the personnel rendering such treatment in neuropsychiatric hospitals. Despite this awareness, deaths due to heat prostration have been noted by Wright to occur "if the temperature of the bath water remains at or above 98 F., for any length of time."[1] Heat pyrexia (heat stroke), usually a much more serious complication of high environmental temperature than heat prostration (heat exhaustion), has not been reported in the literature as a complication of the sedative bath. However, we have encountered such a case in our hospital. Heat pyrexia followed upon an 80-minute continuous bath with the temperature of the water not exceeding 97 F.

Case Report

Past History. The patient, a 39-year-old white male, was diagnosed as having general paresis in 1942, the date of primary infection not being ascertainable. In January, 1943 he was admitted to the Veterans Administration Hospital, Bedford, Massachusetts, where treatment with tryparsamide and bismuth was given between 1943 and 1946. Between 1946 and 1948 the patient received four courses of penicillin, each of 9 million units, malarial therapy, and fever therapy (triple typhoid vaccine intravenously). Despite this intensive treatment, the spinal fluid serological findings remained positive, and the colloidal gold curve remained typically paretic in type, although the cell count and total protein became normal.

Mentally, the patient was in poor contact with reality, was deluded, confused, and his speech irrelevant. Because of periods of marked overactivity, disturbed behavior, and assultiveness, the patient resided on a ward for disturbed patients and received frequent courses of hydrotherapy in the form of sedative baths. This form of treatment was effective in quieting the patient and had never been attended by any untoward signs or symptoms.

Present Illness. On October 11, 1948 at 9:30 a.m., the patient was placed in a sedative bath. Just prior to this, and again at 10 and 10:30 a.m. the patient's general appearance, pulse, and respiration were checked and found to be within normal limits. The temperature of the water was recorded at 96 F. by two thermometers and did not vary by more than 1 degree in either direction for the whole of the time that the patient was in the tub. At 10:50 a.m., 80 minutes after the patient was placed in the bath, cyanosis, frothing at the mouth, and involuntary movements of the extremities were noted by the hydrotherapist. The patient was removed from the bath and examined by a physician, who found the patient to be in shock with the blood pressure 60 mm./Hg systolic and 32 mm./Hg diastolic. Adrenalin was administered, and the patient transferred to the medical service.

Upon arrival at the acute medical ward one-half hour after removal from the bath, the patient was still intensely cyanotic, and the pulse and respiratory rates were 180 and 24 per minute respectively. The rectal temperature was 106.8 F. In transit from his ward the patient had become incontinent of urine and feces, and upon arrival at the medical

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This study is part of a project supported by a research grant from the National Institutes of Health, U. S. Public Health Service.

ward feces were still oozing freely from the rectum. The skin was cool and moist. Steps were immediately taken to combat the circulatory collapse by the administration of concentrated human serum albumin in dextrose solution; as well as the hyperthermia by the continuous application of alcohol, with evaporation facilitated by the use of a fan. Physical examination then revealed the following: The pupils were pin point in size, the eyeballs fixed, and ophthalmoscopic examination after instillation of a mydriatic agent revealed the fundus to be normal; the deep tendon and superficial reflexes were entirely absent; the extremities were flaccid; the neck was moderately rigid; and the Hoffman and Babinski signs were negative.

By 12 noon, 40 minutes after the patient was admitted to the ward, the blood pressure was 70 mm./Hg systolic, 30 mm./Hg diastolic; pulse rate was 146, respiration 24 per minute. The rectal temperature had fallen to 102.8 F. The cyanosis was now minimal, but as yet the patient could not be aroused. Between 12 noon and 1 p.m. the patient came out of coma, the blood pressure rising to 102 mm./Hg systolic, 60 mm./Hg diastolic, and the pulse falling to 112 per minute. Neurological examination now revealed the Babinski sign to be positive bilaterally, the deep tendon reflexes absent, and the nuchal rigidity persisting.

During the early afternoon the patient became increasingly restless. Re-examination revealed the abdomen to be rigid, silent, and slightly distended, and palpation seemed to increase the patient's distress. Rapid and grunting respirations were now present, and the pulse rate was 140 per minute. The blood pressure was 110 mm./Hg systolic and 70 mm./Hg diastolic. Roentgenological examination of the chest and of the abdomen in the upright and supine position revealed no abnormalities to be present. The patient was observed closely, and during the next four hours he became progressively more comfortable, and the abdomen became less and less rigid. Catheterization performed at 3 p.m. yielded 27 cc. of urine. A lumbar puncture revealed the cerebrospinal fluid to be blood tinged, but not under increased pressure.

On the basis of the clinical and laboratory findings, a diagnosis of heat stroke with lower nephron nephrosis was made.

Course. Clinically the patient appeared to be doing fairly well, despite continuing oliguria, until the eighth day. All urines to this time showed albumin, hyalin casts, fine granular casts, and coarse granular casts. The temperature was between 102 and 102.8 F. for 72 hours, and then was normal. The blood pressure recordings were normal. The abnormal neurological signs had cleared, and normal reflexes had returned by the fourth day, although a lumbar puncture on this day again revealed a blood-tinged spinal fluid. On the eighth day facial edema was present; the nonprotein nitrogen was 160 mg. per cent; and the carbon dioxide concentration was 25 volumes per cent. On the ninth day a slightly elevated serum bilirubin was found, and subsequently a 3 plus cephalin flocculation and a 25 per cent bromsulphalein retention in one-half hour (5 ml. of bromsulphalein per kilogram body weight) were observed, indicating parenchymal liver damage as a result of hyperthermia. On the tenth day, with facial edema more marked and peripheral edema also evident, the nonprotein nitrogen now 168 mg. per cent, the patient entered the diuretic phase, indicating return of renal tubular function. This was either a spontaneous diuresis or a possible result of the administration of procaine hydrochloride intravenously.[2] The patient eventually made a complete physical recovery. Mentally there were no obvious changes which could be attributed to brain damage caused by the hyperthermia.

Discussion

Three clinical entities resulting from excessive environmental temperature are recognized. These are heat cramps, heat exhaustion, and heat pyrexia. The most serious of these is heat pyrexia, which has received careful attention in the literature.[3-5] In brief, heat pyrexia can occur whenever the mechanisms for the elimi-

nation of heat from the body are inadequate or interfered with for a long enough period of time.

In the case presented, the bath water temperature was between 95 and 97 F., which is below the rectal temperature, but between 2 and 5 degrees above the skin temperature; therefore, not only were the mechanisms for heat elimination (convection, conduction, radiation, and evaporation) interfered with, but heat was actively added to the body during the 80 minutes the patient was in the bath.[6] This led to heat pyrexia with coma and circulatory collapse. Why the patient was able to tolerate similar sedative baths even for much longer periods before, but not on this particular day, remains unexplained. Two faulty bath thermometers recording the water temperature lower than it actually was is a possible but unlikely explanation. A more likely possibility is that the patient had fever as a result of his overactive behavior or from some other cause, which increased the metabolic rate and thus heat production.

Owing to the increased danger that exists when neutral, warm, or hot baths are given to patients with a fever, it would appear that a normal rectal temperature would be a prerequisite to the institution of such therapy. This, however, has not been the practice in our own hospital,[7] and Wright even advised against the taking of the temperature of all patients before treatment as a routine practice "because of the possibility of augmenting restlessness, agitation, or excitement."[1] In a disturbed psychotic patient, a flushed face and elevated pulse and respiratory rate would be physical signs consonant with the agitated state of the patient and would not therefore be contraindications to placing the patient in a sedative bath. The same physical signs might just as well, however, indicate the presence of fever, which would be a contraindication for this form of treatment. Therefore, the taking of the rectal temperature is the only certain way to determine whether a sedative bath is or is not contraindicated.

Summary

A case of heat pyrexia following a sedative bath with the temperature of the water between 95 and 97 F. is presented. The need for taking rectal temperatures and instituting such treatment only if the rectal temperature is found normal is stressed.

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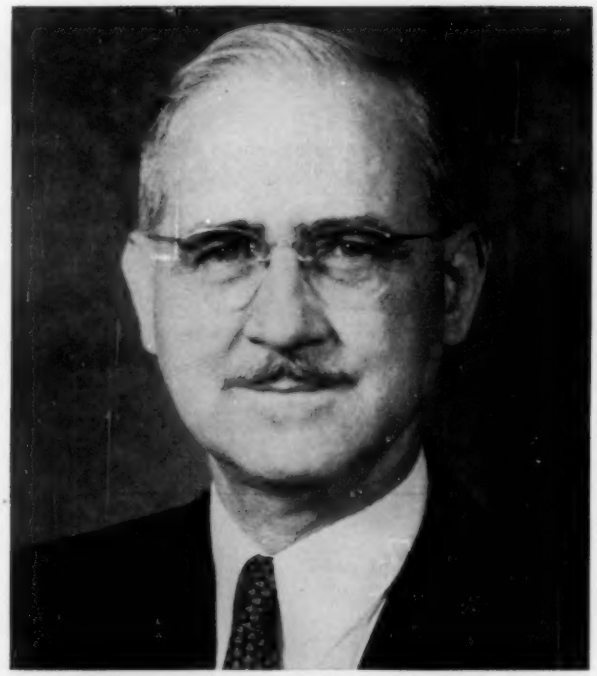

ARTHUR C. JONES, M.D.

. . . the President of the American Congress of Physical Medicine and Rehabilitation for 1958-59, Doctor Arthur Carhart Jones of Portland, Oregon.

Dr. Jones assumed his presidential duties at the recent Congress meeting in Philadelphia. He was president-elect during the preceding year. Dr. Jones was welcomed to office by the retiring president, Dr. Donald L. Rose of Kansas City, Kansas.

Dr. Jones was born on September 4, 1896 in Oberlin, Ohio. He was graduated in 1926 from the University of Oregon Medical School and was licensed to practice medicine in Oregon in 1927.

He is serving as Director, Department of Physical Medicine and Rehabilitation, University of Oregon Medical School since 1933; Medical Director, Portland Rehabilitation Center since 1948; Director, Department of Physical Medicine, Good Samaritan Hospital since 1931; Director, Department of Physical Medicine, Holladay Park Hospital; Consultant in Physical Medicine and Rehabilitation, Veterans Administration Hospitals, San Francisco Area; and Consultant in Physical Medicine and Rehabilitation, U. S. Army Madigan General Hospital at Fort Lewis, Washington. During the years 1942-1946, Dr. Jones was in the Army Medical Corps, first as Captain raising later to the rank of Major.

In addition to Dr. Jones' affiliation with the American Congress of Physical Medicine and Rehabilitation and the American Academy of Physical Medicine and Rehabilitation, he is also a Diplomate of the American Board of Physical Medicine and Rehabilitation. He is currently serving as a member of the Editorial Board of the *Archives of Physical Medicine and Rehabilitation*. He also has membership in Nu Sigma Nu, Alpha Omega Alpha, Sigma Xi, American Medical Association, American Rheumatism Association. He is married to Doris Wolcott Jones who is currently serving as Vice-President of the Woman's Auxiliary to the American Congress of Physical Medicine and Rehabilitation.

LOUIS B. NEWMAN, M.D.

. . . the president of the American Academy of Physical Medicine and Rehabilitation for 1958-59, Doctor Louis B. Newman of Chicago.

As a prelude to his medical career Dr. Newman received his degree in mechanical engineering from the Illinois Institute of Technology, in order to be more adequately prepared for the specialty of physical medicine and rehabilitation which he had decided was to be his life's work. Dr. Newman received the degree of Doctor of Medicine in 1931 from Rush Medical College, University of Chicago, and continued his training with an internship at Cook County Hospital. He developed apparatus for local and general hypothermy and received a special award in 1939 for cryotherapy from the American Congress of Physical Therapy.

At the onset of World War II, Dr. Newman enlisted in the Navy and received the rank of Commander. He served as head of the Department of Physical Medicine and Rehabilitation at the Naval Hospital, Oakland, California, and later in Seattle. In March of 1946, Dr. Newman was placed on inactive duty by the Navy and returned to his home in Chicago to take up his newly appointed duties as chief of the physical medicine and rehabilitation service at the Veterans Administration Hospital, Hines, Illinois, a position in which he served until October, 1953. At the same time, he was also appointed professor of physical medicine at Northwestern University Medical School.

In 1950, Dr. Newman was one of the organizers of the Chicago Society of Physical Medicine and Rehabilitation and was elected the first president of that organization. Since October, 1953, he is serving as Chief of the Physical Medicine and Rehabilitation Service at the Veterans Administration Research Hospital. He is a member of the American Medical Association; American Society of Mechanical Engineers; American Congress of Physical Medicine and Rehabilitation; Association of Military Surgeons; Chicago Society of Physical Medicine and Rehabilitation; National Society for the Prevention of Blindness; International Society for the Welfare of Cripples; Society of American Military Engineers; World Medical Association; and others. He also has membership in the Phi Delta Epsilon and Sigma Alpha Mu fraternities. He is serving on the Medical Advisory Boards of the American Association of Rehabilitation Therapists; Armour Research Foundation, Illinois Institute of Technology; Association for Physical and Mental Rehabilitation; The National Foundation, Inc.; and Multiple Sclerosis Foundation.

Doctor Newman has been the recipient of the following awards:

1) The 1958 Civil Servant of the Year Award for "outstanding accomplishment and devotion to public service"
2) Distinguished Service Award for 1957 from the Illinois Institute of Technology "in recognition of exceptional services to the fields of science and medicine"
3) The John E. Davis Award for 1956 by the Association for Physical and Mental Rehabilitation "for distinguished leadership and outstanding service in the field of Physical Medicine and Rehabilitation"
4) Photograph selected for the Armed Forces Medical Library, Washington, D. C., as part of a collection of more than 25,000 photographs and prints of medical men of the past 400 years who have made significant contributions to the medical sciences
5) Commendation from the President's Committee on Employment of the Physically Handicapped, for 1956, "in grateful appreciation for service in behalf of our physically handicapped fellow citizens"
6) The B'nai B'rith Award "in recognition and appreciation of his services rendered in the rehabilitation of the hospitalized veterans at the Veterans Administration Hospital, Hines, Illinois"

In addition to his busy professional life, Dr. Newman has written numerous articles which have been published in various medical journals and presented lectures and illustrated talks to various organizations interested in physical medicine and rehabilitation of handicapped people. He is married to Rose M. Newman who is Treasurer of the Woman's Auxiliary to the American Congress of Physical Medicine and Rehabilitation.

CHARLES D. SHIELDS, M.D.

. . . the fifth vice-president of the American Congress of Physical Medicine and Rehabilitation, Doctor Charles Daniel Shields of Washington, D. C.

The members of the Congress are pleased to acquaint you with their newest officer and member of the Board of Governors. Dr. Shields was born on February 18, 1910, in Buffalo, New York. He attended Canisius College in Buffalo; he received his medical degree in 1934 from Georgetown University, Washington, D. C. He also holds the degree M.P.H. from Harvard University.

His military service was inaugurated in 1930 as a member of the Georgetown University Medical R.O.T.C.; he is now serving as Colonel in the United States Army Reserve Corps. During his army career he was Chief, Physical Medicine Service, Brooke Army Hospital at Ft. Sam Houston, Texas. He is currently Director, Department of Physical Medicine and Rehabilitation, Georgetown University Hospital and Professor of Physical Medicine and Rehabilitation at Georgetown University.

His membership in medical and scientific societies includes the American Academy of Physical Medicine and Rehabilitation; American Medical Association; District of Columbia Medical Society; American Academy of Neurology; Southern Medical Association; American Association of Military Surgeons, and Alpha Omega (Georgetown Chapter). He became a diplomate of the American Board of Physical Medicine and Rehabilitation in 1953. In 1956, he was awarded the Presidential Citation for Aid to Physically Handicapped.

PAUL A. NELSON, M.D.

. . . the newly elected Chairman of the Editorial Board, of the *Archives of Physical Medicine and Rehabilitation*, Doctor Paul A. Nelson of Cleveland.

Born on November 25, 1920 in Minneapolis, Dr. Nelson attended Gustavus-Adolphus College in St. Peter, Minn., and received his medical degree from University of Minnesota Medical School in 1946. He became a diplomate of the American Board of Physical Medicine and Rehabilitation in 1952. He began his term of service on the Editorial Board in 1955 filling the vacancy created by the death of Dr. Walter M. Solomon. He succeeds Dr. Earl C. Elkins.

Dr. Nelson's membership in professional and scientific organizations includes American Academy of Physical Medicine and

Rehabilitation, American Rheumatism Association, American College of Physicians, American Academy for Cerebral Palsy, American Medical Association, Sigma Xi (Mayo Chapter), and American Association for the Advancement of Science. He has authored fourteen scientific articles.

He is currently serving as Medical Director, Course in Physical Therapy, Frank E. Bunts Educational Institute, and Associate Professor, Department of Physical Medicine and Rehabilitation, Cleveland Clinic Foundation, Cleveland.

DONALD L. ROSE, M.D.

. . . the most recent appointees to the Editorial Board of the *Archives of Physical Medicine and Rehabilitation*, Doctor Donald L. Rose of Kansas City, Kansas and Doctor Jerome S. Tobis of New York City.

Now serving as professor and chairman of the Department of Physical Medicine and Rehabilitation at University of Kansas School of Medicine, Dr. Rose was introduced to the readers of this section in the January, 1958, issue of the journal upon his election to the presidency of the American Congress of Physical Medicine and Rehabilitation. Dr. Rose's term of service on the Editorial Board is effective January 1, 1959. He is replacing Dr. Earl C. Elkins of Rochester, Minn., who resigned because of his additional duties at the Mayo Clinic.

JEROME S. TOBIS, M.D.

Dr. Tobis was born on July 23, 1915, in Syracuse, New York. He attended City College of New York and received his medical degree from Chicago Medical School in 1943. He became a diplomate of the American Board of Physical Medicine and Rehabilitation in 1951. He is currently Professor and Director, Department of Physical Medicine and Rehabilitation, New York Medical College, and is serving as third vice-president of the American Congress of Physical Medicine and Rehabilitation.

He holds membership in the American Academy of Physical Medicine and Rehabilitation; New York County Medical Society; New York State Medical Society; American Medical Association; New York Society of Physical Medicine and Rehabilitation; American Association for the Advancement of Science; American College of Physicians; American Academy for Cerebral Palsy; New York Academy of Medicine, and New York Academy of Science. Dr. Tobis has authored twenty-one scientific articles. In 1957 he was named Physician of the Year for New York State by the Governor's Commission for Employment of the Handicapped.

On January 1, 1959, he will assume his duties as member of the Editorial Board of the *Archives of Physical Medicine and Rehabilitation*. Dr. Tobis replaces Dr. Fred B. Moor.

MICHAEL KOSIAK, M.D.

. . . the recipient of the 1958 Essay Award, Doctor Michael Kosiak, for the paper, "The Pathology of Ischemic Ulcers." Born in Chisholm, Minnesota, Dr. Kosiak was educated at the University of Minnesota where he also received his medical degree. He was an NFIP Fellow in Physical Medicine and Rehabilitation at the University of Minnesota from July, 1955 to June, 1958. He is at present, Instructor, Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School.

Below: Hail and Farewell! The retiring president of the American Academy of Physical Medicine and Rehabilitation, George D. Wilson *(left)* welcomes the incoming executive officer, Louis B. Newman *(right)*.

Awards of Merit for the Year 1958

The Committee on Gold Key Award presented through its chairman, Dr. Frederic J. Kottke, the distinguished service key to:

HOWARD A. RUSK, M.D.

HOWARD A. RUSK, M.D. — *Physician, Educator and Humanitarian: Who has earned the respect of his associates by his wisdom, counsel, good-will and fellowship; who has rendered great service to the field of physical medicine and rehabilitation on a national and international level; who, by his tireless efforts and many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.*

Dr. Rusk was born on April 9, 1901, in Brookfield, Mo. His undergraduate work was taken at the University of Missouri and his graduate work at the University of Pennsylvania. He received his medical degree in 1925. In 1937 he was certified by the American Board of Internal Medicine. Prior to World War II, he was a practicing internist in St. Louis, and a member of the faculty of the Department of Medicine, Washington University. His interests at that time were in the acute aspects of internal medicine rather than in physical medicine and rehabilitation.

While serving as Chief of Medicine at the AAF Hospital at Jefferson Barracks, Mo., he immediately noted that the patients on his service spent long periods of convalescence during which they did nothing of benefit to themselves or to the war effort. They became restless and bored, and their overall physical condition deteriorated. To offset these problems, he conceived and initiated a Convalescent-Rehabilitation Training Program consisting of graded physical exercise, military

training, adult education and purposeful recreation. The results were so impressive that he was ordered by the Office of the Air Surgeon to develop a similar program for all hospitals within the Army Air Force.

He saw the enormity of the civilian need for physical medicine and rehabilitation and determined to devote his professional life to this field. He became the Professor and Chairman, Department of Physical Medicine and Rehabilitation, New York University School of Medicine, the first such major department in any medical school. The physical medicine and rehabilitation service at Bellevue Hospital was established under his direction as the first such comprehensive service for both in- and out-patients in any civilian general hospital in the world.

He has served as chairman, Health Resources Advisory Committee, Office of Defense Mobilization and National Advisory Committee, Selective Service System from 1950-1957; president, International Society for the Welfare of Cripples from 1954-1957; president and/or chairman, American Korean Foundation from 1954 to the present, and president, World Rehabilitation Fund from 1955 up to the present. In addition, he has been an associate editor of the New York Times in which he is an articulate spokesman for rehabilitation. He has written more than 325 articles for professional publications as well as four important books. His fifth book, "Rehabilitation Medicine," written in collaboration with his associates at New York University-Bellevue Medical Center has recently been published.

Dr. Rusk's many honors and achievements include nine honorary degrees, two Lasker Awards, the Dr. C. C. Criss Award, the Gold Medals of the National Institute for Social Science and the International Benjamin Franklin Society as well as decorations by the governments of Korea, France, Guatemala, and Colombia.

ARTHUR L. WATKINS, M.D.

ARTHUR L. WATKINS, M.D. — *Physician, Educator and Humanitarian: Who has earned the respect of his associates by his wisdom, counsel, good-will and*

fellowship; who has rendered great service to the field of physical medicine and rehabilitation through his services as author as well as enthusiastic worker thereby making him representative of outstanding leadership in physical medicine and rehabilitation; who, by his tireless efforts and many accomplishments has notably advanced the Science and the Art of Physical Medicine and Rehabilitation.

Dr. Watkins was born on July 18, 1909, in St. Paul, Minn. He received his medical degree from Harvard University Medical School in 1935, and continued postgraduate training in neurology at Massachusetts General Hospital.

Early in the activities of the Baruch Committee on Physical Medicine, Dr. Watkins transferred his interest from neurology to physical medicine and rehabilitation. In 1944, under a grant from the Baruch Committee, he began a graduate training program in physical medicine which continues under his direction. In 1947, he became a charter member of the American Board of Physical Medicine and Rehabilitation. He was president of the American Congress of Physical Medicine and Rehabilitation (then American Congress of Physical Medicine) in 1950-51. He is currently vice-chairman of the Section on Physical Medicine of the American Medical Association and is also serving as a member of the Editorial Board of the *Archives of Physical Medicine and Rehabilitation* and the Board of the American Registry of Physical Therapists. Dr. Watkins is assistant clinical professor of medicine and medical co-director of the program in physical therapy at Simmons College in Boston.

He is a member of the Board of Managers, Community Workshops; Overseer's Board, Browne & Nichols School; Department of Public Health, State Advisory Council for the Administration of the Hospital Survey and Construction Act; American Congress of Physical Medicine and Rehabilitation; American Academy of Physical Medicine and Rehabilitation; Massachusetts Medical Society; American Medical Association, and associate member of the American Academy of Neurology. He has authored 106 scientific articles including a recently published book on electrotherapy.

Dr. Watkins was given a presidential award on July 11, 1957, for outstanding services in poliomyelitis.

Awards to Scientific Exhibitors

The Committee on Awards for Scientific Exhibits presented through its Chairman, Dr. David M. Paul, the following:

Gold Medal to Willis C. Beasley, Ph.D., for the exhibit "Ontogenetics and Biomechanics of Ankle Plantar Flexion Forces."

Silver Medal to George H. Koepke, M.D.; James W. Rae, Jr., M.D., and David G. Dickinson, M.D., for the exhibit "The Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration."

Bronze Medal to Frank J. Schaffer, M.D., and A.B.C. Knudson, M.D., for the exhibit "Rehabilitation of the Quadriplegic Patient."

Honorable Mention to Meyer A. Perlstein, M.D.; Harry Elam, M.D., and Marcos Turner, M.D., for the exhibit "Control of Seizures and Hypertonus."

Honorable Mention to Paul Q. Peterson, M.D.; S. D. Pomrinse, M.D., and Bernard D. Daitz, Ph.D., for the exhibit "Strike Back at Stroke: Early Mobilization of the Stroke Patient."

Essay Award

The Committee on Essay Award, presented through its Chairman, Dr. George D. Williams, the award to Michael Kosiak, M.D., for his paper "The Pathology of Ischemic Ulcers." Dr. Kosiak is Instructor, Department of Physical Medicine and Rehabilitation, University of Minnesota Medical School.

A distinguished trio discussing a job well done and new projects to be well done — Donald L. Rose *(left)*, retiring president of the American Congress of Physical Medicine and Rehabilitation; Arthur C. Jones *(center)*, incoming executive officer of the American Congress of Physical Medicine and Rehabilitation; and Frederic J. Kottke *(right)*, president-elect.

abstracts

Osteoporotic Kyphosis with Paraplegia. Warren H. Kempinsky; Peter P. Morgan, and William R. Boniface. Neurology 8:181 (Mar.) 1958.

The authors have surveyed the literature for the causes of paraplegia with reference to the intrinsic osseous diseases and deformities that can cause spinal cord compression. A listing and bibliography of such diseases are given. In their review they noted little reference to the role of osteoporosis in the production of paraplegia. Two cases of osteoporosis resulting in vertebral compression fractures, kyphosis, and paraplegia are presented. The cause of the osteoporosis in one was considered to be principally post-menopausal and in the other to be principally dietary although unrecognized trauma could have played a role. The effects of estrogen-androgen therapy in these cases are twofold. Nitrogen, calcium and phosphorus metabolism is augmented and the accelerated nitrogen catabolism that occurs in acute paraplegia is reversed.

Clinicopathological Study of Ninety-Four Limbs Amputated for Occlusive Vascular Disease. P. J. Kelly; D. C. Dahlin, and J. M. Janes. J. Bone & Joint Surg. 40-A:72 (Jan.) 1958.

Clinicopathological studies were carried out on 94 limbs which were amputated at the Mayo Clinic between March, 1949 and April, 1951. Forty of the limbs were amputated through the thigh and 54 below the knee. These extremities were dissected and the vessels were carefully examined. Multiple fresh frozen sections were prepared and examined microscopically.

Limbs amputated above the knee that contained fresh thrombi in the popliteal or femoral arteries were clinically the most ischemic of all the limbs examined. Patients with diabetes mellitus who were subjected to amputation above the knee did not have fresh thrombi in the popliteal or femoral arteries.

The anterior tibial, posterior tibial, and peroneal arteries of limbs amputated for atherosclerosis obliterans showed no quantitative differences in the degree of occlusion in those amputated above the knee compared with those amputated below the knee.

The pathological features of thromboangiitis obliterans can be confused with those of other forms of occlusive vascular disease, such as thrombosis secondary to embolism. It is important to distinguish between these entities because thromboangiitis obliterans can be treated by conservative amputation, if amputation is necessary, whereas embolism, when it causes ischemic lesion necessitating amputation, almost invariably requires amputation above the knee.

Berry Aneurysms of the Circle of Willis. J. L. Chasm, and W. H. Hindman. Neurology 8:41 (Jan.) 1958.

The authors report on 2,786 consecutive necropsies at the City of Detroit Receiving Hospital. The routine examination always included a search for the presence of saccular aneurysms in the vessels of the circle of Willis and its branches external to the brain. An aneurysm was designated as a local dilatation one millimeter or more in diameter when the adjacent arteries were held in their approximate antemortem position. One hundred and ninety-six saccular aneurysms were found in the 137 patients. The presence of two or more aneurysms in 43 individuals was equivalent to an incidence of multiplicity of 31.4 per cent. The incidence of aneurysms as to sex in this series was 3.5 per cent in males and 7.2 per cent in females. No significant difference between the sexes in the proportion of ruptured and unruptured aneurysms was noted.

The anterior half of the circle was affected 177 times, the posterior half 19 times. There were 53 aneurysms on the middle cerebral and 61 involving the anterior communication artery. The remaining 19 aneurysms affected the vertebral-basilar artery system and its branches. Hypertensive cardiovascular disease was diagnosed clinically or at autopsy in almost 80 per cent of these patients with unruptured as well as ruptured aneurysms. Concerning the pathogenesis, it was the opinion of the investigators that incomplete involution of these embryonic arteries could result in points of medial weakness capable of leading to the later formation of saccular aneurysms. A second factor is the absence of elastic tissue normally concentrated in the internal elastic media.

Mechanism of Production of Papilledema in the Guillain-Barre Syndrome. R. J. Joynt. Neurology 8:8 (Jan.) 1958.

The presence of increased intracranial pressure and papilledema in Guillain-Barre syndrome is generally thought to be due to the external hydrocephalus produced by a blocking of the arachnoid villi by the excessive protein in the spinal fluid. Since the increased pressure and papilledema occur late in the illness there is sufficient time for blockage of the absorption to take place.

Joynt presents a case study to support his hypothesis that the increased intracranial pressure and papilledema is due to an actual increase in the brain substance due to cerebral edema. Histological examination of brain tissue specimens obtained during subtemporal decompression showed marked swelling of the nerve cells with occasional chromatolysis. There was no evidence of inflammatory cells, vascular changes, or demyelination. Similar findings have been reported by several other authors in the past. It is possible that the factors responsible for the prominent nerve root edema in the Guillain-Barre syndrome may also produce cerebral edema.

Laboratory and Clinical Studies with Buffered and Nonbuffered Acetylsalicylic Acid. G. A. Cronk. New England J. Med. 258:219 (Jan. 30) 1958.

Blood salicylic acid levels were determined 10, 20, 30, and 60 minutes after 0.6 gm. of buffered (commercial) and unbuffered aspirin on 20 healthy adults in a cross-over study. There was no significant difference in the rate of absorption or in the maximum concentration attained. The relative effectiveness of both preparations was studied in university students hospitalized for a variety of painful conditions. All patients received 10 grains orally. This dose was repeated as necessary. There was no statistical difference between the two agents in the time required for relief of pain, the duration of the relief and the degree of relief. Approximately 30 per cent in both groups failed to experience any relief. Gastrointestinal symptoms appeared in 0.4 per cent of those administered buffered aspirin and 0.7 per cent in those receiving unbuffered aspirin. In all of these patients subsequent administration of either medication produced no untoward gastrointestinal reactions suggesting that the underlying disease affected the production of these symptoms.

Degenerative Joint Disease in Castrate Mice. Ruth Silberberg; George Goto, and Martin Silberberg. A.M.A. Arch. Path. 55:438 (Apr.) 1958.

To investigate the effect of castration at various age levels on the development of osteoarthritis the authors used 204 mice, dividing them into a control group and groups spayed at one month, six months, and twelve months. They then studied all the joints of these mice and recorded the percentage of joints which were normal, percentage which showed age changes, and the percentage of joints showing osteoarthritis.

In this study there was a marked decrease in osteoarthritis in only those mice spayed at the age of six months. The authors concluded that age changes were delayed by castration in the six months group and hence, osteoarthritis was delayed. They also postulated that when the animal was spayed before six months of age other areas in the body took over the production of estrogen, and when the animal was spayed after 12 months, the age changes were already well established.

Plethysmographic Studies of the Cerebral Circulation: Evidence for Cranial Nerve Vasomotor Activity. Thomas J. Bridges; Kemp Clark, and Melvin D. Yahr. J. Clin. Invest. 37:763 (May) 1958.

A cast vitallium trephine button was surgically inserted beneath the dura in an air- and water-tight fashion. The button was connected to a plethysmograph by plastic tube. With this apparatus the authors recorded the arterial pulse volume and the intradural volume change. They used 18 patients ranging from 26 to 48 years of age who were undergoing "injection type" lobotomy, cervical thoracic sympathectomy, or head and neck dissection operations. Numerous recordings were then made on each patient, testing the effect of various cerebral vasodilating drugs and procedures, cerebral vasoconstricting drugs and procedures, and finally, drugs and procedures in which no cerebral vasomotor change was expected. The results were tabulated and summarized. However, the changes were recorded qualitatively and since this was not a closed system, one could not be sure whether the intradural volume changes were due to change in the volume of the cerebrospinal fluid, venous engorgement, vasoconstriction or dilation.

An Investigation of the Pulmonary Function of Paraplegics. Allan Hemingway; Ernest Bors, and Richard P. Hobby. J. Clin. Invest. 37:773 (May) 1958.

The authors were able to evaluate selectively the effect of various muscles used in respiration on pulmonary function by studying 63 patients with transection of the spinal cord at various levels. Vital capacity, maximum breathing capacity, expiratory reserve, residual volume, arterial blood gases and pH, and ventilation during exercise were studied. The results were recorded according to the lesion — cervical, thoracic or lumbar.

It was found that the vital capacity and maximum breathing capacity of patients with lumbar lesions were normal, while the group with lower cervical lesions had a vital capacity approximately two-thirds of normal and a maximum breathing capacity of one-half of normal. Paraplegics with thoracic lesions had vital capacities and maximal breathing capacities between the values for the cervical and lumbar lesion groups. The resting expiratory reserve volume expressed as a percentage of the vital capacity was below the normal percentage only for the group of paraplegics with cervical lesions. For this group the percentage volume was one-half normal. Residual volume of all groups was significantly higher than the normal group. Arterial blood gases of all groups were normal and the ventilatory response to exercise for all groups of patients did not differ from normal.

Degenerative Joint Disease in Castrate Mice: II. Effects of Orchieotomy at Various Ages. Ruth Silberberg, Robert Thomasson, and Martin Silberberg. A.M.A. Arch. Path. **65**:442 (Apr.) 1958.

In this study the authors described two series of experiments. In the first they castrated 53 closely inbred mice at the age of one month. They used 77 of the same group as controls. In the second series they castrated 143 mice in evenly divided groups at one month, six months, and 12 months, using 50 mice as a control. They again recorded the percentage of intact joints, the percentage of joints with age changes and the percentage of joints with osteoarthritis. In the first series of this study there was an incidence of six per cent osteoarthritic joints in the castrate mice compared to 43 per cent in the control group and in the second series there was an incidence of six per cent osteoarthritic joints in those castrated at six months compared to thirty per cent osteoarthritis in all other groups.

It is of interest that in this study on male mice there was a higher incidence of age changes in the castrated mice than in the control group. It was felt that this increase in age changes represented joints which otherwise would have gone on to develop osteoarthritis but this was delayed because of the castration.

In regard to the lowest incidence of osteoarthritis in the six month group it was felt that the male sex hormone must act on the articular cartilage at an early age, i.e., during the phase of active skeletal growth. Therefore, a lack of testicular hormone during this period of rapid growth results in a delay in the skeletal development and aging and also retards growth at the epiphyses. From the two studies the authors concluded that estrogen does not promote growth but enhances the process of aging whereas testosterone promotes skeletal development and aging.

Comparison of Buffered and Unbuffered Acetylsalicylic Acid. Robert C. Batterman. New England J. Med. **258**:213 (Jan. 30) 1958.

The relative effectiveness of commercially available buffered aspirin (Bufferin) and unbuffered aspirin was studied in 160 patients under several different clinical investigational conditions. The effects of a single dose, daily dose, short term therapy of up to three weeks and long term therapy of up to nine weeks were compared using the double blind technic supplemented by cross-over studies.

In none of the four types of studies was there any indication that the buffered preparation was any different than the unbuffered in analgesic potency and in frequency of gastrointestinal reactions. Serial determinations of blood salicylate levels after a 10 grain dose in 112 convalescing patients and in nine normal subjects failed to reveal any difference in the rapidity of absorption of salicylate.

A critical analysis of the three studies in the literature reporting more favorable results with the buffered preparation is given, and it is suggested that these results do not necessarily indicate that the buffered aspirin is a superior drug. The author concludes that in the tablets studied the antacid added serves no useful purpose and offers no advantage over aspirin alone.

Muscle Action, Bone Rarefaction, and Bone Formation. Max Geiser, and Joseph Trueta. J. Bone & Joint Surg. **40-B**:282 (May) 1958.

Prolonged immobilization, the compression forces of weight bearing, and the stresses and strains exerted on bone through muscular action play a role in maintaining the normal structure of bone. The present experimental work was undertaken to study the factors responsible for bone removal in immobilized limbs and to collect data on the mechanism of bone rarefaction.

Eighty-two rabbits from three to twelve months of age were used in five different experiments. These were 1) tenotomy of tendocalcaneus; 2) Plaster of Paris immobilization alone; 3) Plaster of Paris and faradic stimulation; 4) fracture of the tibia with wire circlage and Plaster of Paris, and 5) resection of the peritendinous tissue around the tendocalcaneus. The authors studied the changes that took place in the calcaneus radiologically, microscopically, and by angiograms.

There was no appreciable difference in the rate or degree of osteoporosis following heel cord tenotomy compared with plaster immobilization. On the immobilized animals faradic stimulation applied at least eight times daily did result in significantly less osteoporosis. In these experiments bone rarefaction was characterized by a great increase

in the vascularity of the bone; this increase ceased when the bone reached its final precarious bone density. Bone reconstruction was also seen to be accompanied by a more localized increase of vascularity.

Stress Fractures of the Tibia in Athletes or "Shin Soreness." M. B. Devas. J. Bone & Joint Surg. **40-B**:227 (May) 1958.

"Shin soreness" or "shin splints" is a relatively common complaint of athletes who do a great deal of running. This study is based on a considerable number of patients with "shin soreness" seen by the author, in 16 of whom there was definite radiological confirmation of the diagnosis of stress fracture. The symptoms, signs, and physical findings are discussed with numerous photographs illustrating the typical fracture described. This type of fracture is difficult to diagnose because it is an incomplete fracture involving only one cortex and is not apparent in the radiographs until a later stage which may be two to three months after the onset of symptoms. The mechanism of this fracture is not clear but the author feels that the strong contraction of the calf muscles bows the tibia anteriorly and if the patient persists in running a fracture may occur. Apparently most of the patients with this complaint stop running before a fracture can occur. The treatment is simply rest, either by abstention from running and all activities that cause symptoms or elastic adhesive strapping.

Effects of Lowered Muscle Temperature Upon Neuromuscular Blockade in Man. Eleanor Zaimis; Thomas H. Cannard, and Henry L. Price. Science **128**:34 (July 4) 1958.

In cats it had previously been demonstrated that lowering muscle temperature increased the magnitude and duration of action of depolarizing neuromuscular blocking drugs. With substances that block by competition with acetyl choline, i.e. tubocurarine, the blockade is decreased by cooling.

This study described similar studies on nine anesthetized patients and two volunteers. Muscle temperature was lowered 3-5 C. by surface cooling. Temperature was recorded with thermistor needles inserted in the tibialis anticus muscle. The muscle was stimulated at its motor point by surface electrodes every ten seconds and foot movements were used to determine the relative effectiveness of the blockade. The opposite leg which was not cooled was used as a comparison reference. Decamethonium, suxamethonium, and tubocurarine were administered intravenously.

The results with the methonium drugs duplicated animal experiments in that the magnitude and duration of the blockade was greater in the cold muscle. In the six experiments with tubocurarine only three duplicated animal results, that is a greater effect in the warm leg. In two experiments the cold leg was affected more and in one there was no difference. Additional studies are under way in which muscle tension rather than foot motion is to be used to evaluate blockade.

Rotational Movements of the Spine with Special Reference to Scoliosis. Robert Roaf. J. Bone & Joint Surg. **40-B**:312 (May) 1958.

The author studied the spines of stillborn babies and the radiological examination of the spines of normal children to determine the normal movements of the spine and also the relationship between movements of the normal spine and the deformity scoliosis. Using these flexible stillborn spines which had not yet developed the adult curves, the author showed photographs demonstrating how flexion and extension of the spine occurs in all the vertebrae not just the thoracic vertebrae. They also demonstrated how lateral bending can occur without rotational movements or vice-versa how rotation can occur without lateral bending. The mechanics in the development of scoliosis are discussed, the author stressing the importance of a primary rotational deformity as the basic cause. This study appears to repeat previous studies. It is questionable whether or not motions in the neo-natal spine can be used as indices of motion of spines of older children.

Steroid Therapy (concluded). J. H. Glyn, and D. R. L. Newton. Ann. Phys. Med. 4:176 (Feb.) 1958.

In this concluding article on steroid therapy, the authors discuss local injection of steroid compounds. From the literature they reviewed hydrocortisone tertiary butylacetate was the most effective steroid for local injection. The clinical cure rate of local joint disease varied with the author and with his persistence. Duff reported 50 per cent worthwhile and sustained benefit in a series of 60 patients who had a total of 1020 local injections. The authors of this article are quite optimistic about the success of local injection if the proper dose is used for the proper joint and if the injections are continued for a long enough period of time. Local injections in osteoarthritis, herniated discs, various orthopedic conditions of the joints, tendons and ligaments were also discussed.

Local Treatment of Psoriasis, Including a Review of Medical Literature. Morris Ant. M. Times **85**:1397 (Dec.) 1957.

In a review of medical literature with additional cases treated by the author, Riasol gave satisfactory results in a series of 34 cases of psoriasis which had resisted previous therapy. There was relief of itching in 94 per cent of cases, complete or partial disappearance of the scaliness in 91 per cent, and fading of the erythema in 82 per cent. In 32 per cent all cutaneous manifestations of psoriasis were cleared completely. There were no adverse reactions. Riasol contains mercury 0.45 per cent chemically combined with soaps, phenol 0.5 per cent, and cresol 0.75 per cent in a saponaceous liquid vehicle. A thin layer is applied once or twice daily after bathing the affected areas. The most effective ingredient of Riasol is the small percentage of mercury chemically combined with soaps. In this form, the mercury penetrates the superficial layers of the epidermis and combats the acanthosis or excessive proliferation of the prickle-cells located in the stratum mucosum. The phenol in Riasol is antipruritic while the cresol is antiseptic and aids in loosening adherent scales.

A New Tranquilizing Soporific for Insomnia; the Value and Safety of Methapyrilene and Scopolamine in Combination. H. M. Feinblatt. J. Gerontol. 13:48 (Jan.) 1958.

In a clinical study of insomnia, a combination of methapyrilene hydrochloride with scopolamine hydrobromide compared favorably with phenobarbital. The preparation used was Sleep-Eze tablets, which contain methapyrilene hydrochloride 25 mg. and scopolamine hydrobromide 0.125 mg. The dosage administered was two tablets half an hour before retiring. Satisfactory relief of insomnia over a period of three months was obtained in 88 per cent of elderly patients, as compared with only 16 per cent while using a placebo. The medication reduced the time interval before falling asleep an average of one hour and twenty minutes and provided an average gain in sleeping time of two hours and eighteen minutes. The study indicated that Sleep-Eze tablets provide an effective tranquilizing soporific for the treatment of most cases of insomnia. Unlike phenobarbital, this medication remains fully effective in the same dose, leaves no hangover, and is completely free from habituating effects. Only minor and occasional untoward actions were observed.

Progressive Myositis Ossificans: Review of the Literature and Report of a Case. H. L. Cox. North Carolina M. J. 18:459 (Oct.) 1957.

Progressive myositis ossificans is characterized by progressive, widespread ossification of soft tissue (primarily muscle and tendon) leading to crippling immobility. The consensus of opinion seems to be that the disease represents an inborn error of metabolism or a primitive mesenchymal defect. The etiology is unknown. Actual bone formation distinguishes this disease from myositis fibrosa, dermatomyositis, polymyositis hemorrhagica, multiple exostoses, and calcinosis interstitialis ossificans. The author cites the case of a girl who showed the initial symptoms of myositis ossificans at six years of age, when a bony tumor appeared on her knee following a fall. When the child was seven years old, her mother first noticed a lump on the back of her head (not preceded by known trauma). Approximately one month later a large area of swelling and induration appeared on the posterior cervical region. This process rapidly extended into the trapezius muscles of both sides, then into the shoulder and chest muscles. Limitation of movement in the involved muscles occurred early.

The sequence of events is usually initiated by the appearance of swellings, of varying size, which are firm. They increase in size for approximately one week, remain stationary for approximately one week, then regress for one week, leaving stony hard areas in the muscle. This process keeps recurring in the same area until the muscle is ossified and immobilization is complete. In the girl presented, virtually all the deformity and immobility occurred during the first year of the disease. There was never any fever, malaise, or pain. Blood chemistry determinations and electrocardiogram tracings continued to be normal, as were the findings with the electroencephalogram made at the inception of the disease. The patient was treated shortly after the onset with corticotropin, cortisone, and x-ray without deriving any benefit. For the past five years her mother has given her soda water (NaH_2CO_3) three times daily and Amphogel. With no other treatment her disease has been quiescent for the past five or six years.

Encephalomyelitis Myalgica Epidemica, a Disease Resembling Poliomyelitis (Epidemic Neuromyasthenia, Benign Myalgic Encephalomyelitis). (In German) **O. Gsell.** Schweiz. med. Wchnschr. 88:488 (May 17) 1958.

The author reports on three epidemic outbreaks in Switzerland of a disease resembling poliomyelitis; one in a hospital in Frohburg, canton St. Gallen, in 1937; one in a military encampment in Degersheim in 1939; and one in another military encampment in Erstfeld in 1937. The epidemic in Frohburg occurred in a gynecologic ward and involved 7 nurses, 5 patients, 1 physician, 1 nurse's aid, and 3 contact persons; 3 of the affected persons had pareses, 8 showed the clinical aspect of

meningitis, and in 6 with fever the disease was abortive. An acute onset, a febrile course of several days' duration, stiffness of neck and back, leukopenia, normal cell counts in the cerebrospinal fluid (1 or 2 per cubic millimeter and only once 8), and slight reactions to the gold sol test were noted. Headache, pain in joints and limbs, paresthesias, and during convalescence adynamia and lability of circulation were observed. The pareses were manifested by weakness of muscles without absence of reflexes and were associated with severe neuralgia in the affected extremities. Involvement of the air passages with bronchitis and with pulmonary infiltration was notable, but these disturbances cleared up rapidly without complications, and so did the weakness of the muscles. Mild recurrences and neurasthenic secondary symptoms were observed. All the patients recovered without residues. The second epidemic in Degersheim involved 73 young adults, 5 of whom had pareses, 2 had encephalitic symptoms, 12 showed a meningoneuritic aspect, and 54 had mild disturbances of the air passages. The disease was benign and of short duration, with mild fever and complete disappearance of muscular weakness. Neuralgic accompanying symptoms were observed frequently; of the 19 patients with pareses and meningeal symptoms, 10 had intercostal neuralgia and pain extending along the course of the sciatic and trigeminal nerves. Disturbances of the autonomic nervous system, with fatigability, sweating, tremor, and tachycardia, occurred during convalescence. The number of cells in the cerebrospinal fluid varied between 1 and 3 per cubic millimeter in 13 of 17 patients; 6 and 7 cells per cubic millimeter were counted in 2 patients, and an increase to 125 and 250 per cubic millimeter, respectively, was observed in 2 patients with pareses. All 73 patients were able to resume their activities within 3 months. The third epidemic in Erstfeld involved 130 of the 930 persons in the military encampment; 6 had encephalomyelitic disturbances with pareses, 16 had meningeal symptoms, and in 108, with mild disturbances of the air passages, the disease was abortive. The number of cells in the cerebrospinal fluid and the protein content were not increased. There was mild fever which was diphasic in 3 patients. Headache, stiffness of back and neck, myalgia, rhinopharyngitis, bronchitis, sweating, and zones of hyperesthesia were observed. The pareses were mild and disappeared within 2 to 4 weeks. All patients recovered, but some of them were ill for 5 weeks.

These epidemics were similar to those which were observed in other countries, such as Iceland, England, South Africa, Australia, and the United States, and for which various terms, such as "disease simulating or resembling poliomyelitis," Iceland disease, Akureyri disease, epidemic neuritis, benign myalgic encephalomyelitis, and epidemic neuromyasthenia, were used. The authors prefer the term "epidemic myalgic encephalomyelitis," since the disease was benign only insofar as there were no deaths. All virologic studies gave completely negative results. In contrast to poliomyelitis, abnormal changes in the cerebrospinal fluid were also absent as a rule. There was no evidence of muscular atrophy, and tendon reflexes were within normal range.

Bursitis. F. C. Durbin. Brit. J. Clin. Pract. 12:317 (May) 1958.

Under normal conditions, the quantity of fluid produced by the endothelial lining of a bursa is small, but it may be excessive when a state of hydrops of the sac exists. This may not be painful unless the fluid is under tension or because the sac restricts free movement and is pressed on by the tissues. More often the increase in fluid is a result of true inflammation. Whatever the cause, an enlargement of a bursal sac is usually called bursitis. Bursae may exist between the skin and the underlying bony prominences or between the skin, muscles, or tendon and bone. Many are adventitious and occur either because of an underlying bony abnormality, such as an exostosis, or because abnormal pressure is applied to the area. Occupational bursitis is produced by constant mild repetitive trauma, examples of which are housemaid's knee and miner's or writer's elbow. Bursitis in adventitious bursae is frequently seen in association with hallux valgus and with exostoses of the long bones. It sometimes occurs at the bone ends in amputation stumps.

Other causes of bursitis, besides repetitive trauma, are arthritis, tuberculosis, syphilis, and gout. The bursae which most commonly become inflamed are listed. Occupational bursitis can be largely prevented by protective devices (knee pads and so on). Acute traumatic bursitis will respond to rest, but, if there is hemorrhage, aspiration of fluid and blood and the application of firm pressure will be necessary. Acute suppurative bursitis can be successfully treated early by aspiration, by the administration of penicillin if the organism is penicillin sensitive, and by splintage. The treatment of adventitious bursitis should be to remove the precipitating cause. In the case of hallux valgus this may be the wearing of tight shoes, but, if the bursa is very thickened and the deformity very severe, the only really effective treatment is an operation to remove the exostosis and correct deformity.

The Effect of Cortisone and of Prednisone on the Endocrine Glands in Man. (In French) **J. Guignard, and P. Ducommon.** Schweiz. med. Wchnschr. 88:427 (May 3) 1958.

Cortisone and its derivatives (prednisone, prednisolone) are used in practice for their anti-inflammatory effect. Cortisone, which is an adrenal cortical hormone, not only possesses precise pharmacological properties but also produces an effect on the endrocrine glands because it forms part of the regulatory system by which they are governed. Consequently, it modifies profoundly both the structure and the functioning of the adrenals, the hypophysis, the thyroid, and the islands of Langerhans in the pancreas. The functional and structural modifications so produced were studied by the authors in four patients with fatal illnesses who were given prolonged treatment with cortisone or its derivatives (prednisone, prednisolone). The first patient was a 51-year-old woman with asthma who died of cardiovascular collapse; the second was a 17-year-old youth with myeloid leukemic and hemorrhagic symptoms who died of a cerebral-meningeal hemorrhage; the third was a 55-year-old man with a gastric ulcer and myeloid leukemia who died suddenly in adrenal insufficiency; and the fourth was a 53-year-old man with disseminated lupus erythematosus who died of multiple intestinal perforations.

The histological findings in these patients seem to show that degranulation of the basophil cell is the principal change produced by cortisone in the hypophysis. The degranulation is accompanied by a transformation of the entire cell leading to protoplasmic hyalinization, such as that seen in Crooke's cell. Even small doses of cortisone may result in modifications of the hypophysis. The ensuing functional and structural changes are reversible, but they may persist for prolonged periods.

The inhibition of the secretion of corticotropin produced by the direct action of cortisone on the hypophysis leads to secondary adrenal hypofunction. This is made evident by fatigability and manifestations of hypoglycemia when cortisone is withdrawn. Morphologic observation reveals progressive atrophy of the adrenal cortex with rarefaction of the lipid content of the fascicular zone. These symptoms are also reversible. Cortisone has a depressive effect on thyroid function, as shown clinically by a reduction in the uptake of radioactive iodine (I^{131}) and a lowering of the serum protein iodine level (protein-bound iodine). Prolonged treatment may lead to permanent hypothyroidism. Histologically, the thyroid appears to be dormant; the follicular epithelium is flattened, and the dense, acidophilic colloid material shows no resorption vacuoles. The slackening of thyroid function may be accompanied by goiter, as in a case of lipid nephrosis reported by the authors in a 12-year-old child. Cortisone, by its direct action on the pancreas, seems to favor the secretion of insulin to offset its gluconeogenic effect. A curve of induced hyperglycemia which is prediabetic in type at the beginning of treatment in normal subjects will resume a physiological aspect a few days later. The histological changes produced in the pancreas consist of an increase in, and hypertrophy of, the islands of Langerhans.

The authors emphasize the fact that, even when the glucocorticoids are used for specific therapeutic purposes, they are still adrenal cortical hormones forming part of the endocrine-regulatory system. More or less profound changes are always produced in the endocrine glands by the administration of cortisone and its derivatives.

Rheumatoid Spondylitis Without Rheumatoid Arthritis of Peripheral Joints: Relationship to Rheumatic Fever and Valvular Heart Disease. Leo E. Hollister, and Ephraim P. Engleman. J. Chron. Dis. 8:334 (Sept.) 1958.

Three patients with rheumatoid spondylitis were observed among 135 followed after an attack of rheumatic fever in adult life. Two of these patients had clinical heart disease. This observation raised the question of the relationship between rheumatic fever, rheumatoid spondylitis, and the valvular heart disease accompanying the latter condition. Records were reviewed of 95 patients with rheumatoid spondylitis without involvement of the peripheral joints. Twenty-five of these patients had a history of self-limiting polyarthritis indistinguishable clinically from rheumatic fever, which was usually the stated diagnosis. In two of three patients observed during such an attack, transient atrioventricular block had been demonstrated. Seven definite cases of valvular heart disease were encountered in these 95 patients. Aortic valvular involvement was most frequent. Six of these seven patients had a history compatible with rheumatic fever, three having two attacks. While carditis typical of rheumatoid arthritis is an established pathologic entity, this lesion is probably comparatively infrequent in patients with rheumatoid spondylitis. The present study, as well as others, suggests that most cases of valvular heart disease associated with rheumatoid spondylitis may be attributed to rheumatic fever.

Suppurative Arthritis Complicating Rheumatoid Arthritis. J. H. Kellgren; J. Ball; R. W. Fairbrother, and K. L. Barnes. Brit. M. J. 1:1193 (May 24) 1958.

The authors report on 12 patients, between the ages of 37 and 66 years, with rheumatoid arthritis in whom bacterial infection occurred in connective tissues and on 13 patients, between the ages of 7 and 67 years, with mon-

articular suppurative arthritis associated in most cases with trauma, penetrating wounds, or an obvious source of infection. These 25 patients were the only ones with suppurative arthritis among 91,815 patients admitted to the Manchester Royal Infirmary during the years from 1950 through 1957; these findings show the rarity of the condition. In 9 of the first group of 12 patients, the condition was a suppurative arthritis which was often polyarticular, resembling an exacerbation of the rheumatoid process. The infecting organisms were of the coliform group in 2 patients and were staphylococci in 10 patients, of whom only 3 were sensitive to penicillin. The febrile and leukocytic response to infection with these organisms was often modified or absent, and in some patients the widespread suppuration was revealed only by a systematic examination of the joints at autopsy. Five of the 12 patients with rheumatoid arthritis died, while not 1 patient of the 13 with suppurative arthritis died. It seems that the prognosis can also be much improved in the first group, provided that the correct diagnosis of suppurative bacterial infection is made at an early stage and the infecting organisms can be cultured from either the blood or the infected joint fluid, so that their sensitivity to the available antibiotics can be assessed.

The diagnosis in the second group presented no difficulty, since the symptoms conformed to the classical description of monarticular suppurative arthritis. These patients responded promptly to the antibiotic therapy, and their illness never became serious. The most useful indication of bacterial infection was increased pain and swelling in several joints, accompanied by deterioration in general health and the occurrence of rigors or unexpected discharge of pus. Absence of the normal response to bacterial infection with pyogenic organisms presented a major difficulty. In some patients staphylococcic pus was present, the white blood cell counts were 4,300 and 5,800 per cubic millimeter, and the patients remained afebrile, while other patients had fever from the active rheumatoid disease, and it was only when the fever increased and became remittent that it became apparent that an infective process had supervened. Widespread infection of joints and bones should be suspected in any patient with rheumatoid arthritis in whom there is a sudden deterioration or an unexplained remittent fever, especially if a history of rigors can be elicited. Aspiration of all the more painful joints, with culture of the joint fluid, and repeated blood cultures are required, since this appears to be the only certain way of arriving at a correct diagnosis. If diagnosis can be made at an early stage, appropriate antibiotic therapy and energetic treatment can give excellent results in what may otherwise be a fatal condition.

Poliomyelitis: A Study of Pulmonary Edema. A. B. Baker. Neurology 7:743 (Nov.) 1957.

The case histories and autopsy findings in 10 patients who died of bulbar poliomyelitis associated with extensive pulmonary edema of both lungs which weighed around 500 gm. or more were compared with those in five patients who also died of bulbar poliomyelitis but in whom the lungs showed no pathological alterations and weighed less than 200 gm. Thirteen of the 15 patients were males between the ages of 3½ and 46 years, and 2 were girls aged 4 and 5 years. The comparison was made in an attempt to determine whether specific neurological lesions might be responsible for the pulmonary edema.

Extensive damage to both the dorsal nuclei of the vagus and the medial reticular nuclei of the medulla (the vasomotor centers within the brainstem) was observed in the 10 patients with pulmonary edema. Pulmonary edema did not result from involvement of only one of the above cell groups. This same consistency of damage to these two nuclear groups was not found in the five control patients. It was felt that the most important factor in the production of this neurogenic type of pulmonary edema was the resulting heart failure produced by tachycardia and decreased cardiac efficiency due to vagal damage, and vasomotor collapse secondary to involvement of the vasomotor center. This resulting heart failure produced increased left atrial pressure, with a subsequent increased pulmonary venous and capillary pressure and finally edema.

At the risk of appearing stupid sir, I'm asking just one more time—you wish to have WHAT removed?

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Post Doctoral Scholarships

The Sister Elizabeth Kenny Foundation announces continuation of its program of post doctoral scholarships to promote work in the field of neuromuscular diseases. These scholarships are designed for scientists at or near the end of their fellowship training in either basic or clinical fields concerned with the broad problem of the neuromuscular diseases. The Kenny Foundation Scholars will be appointed annually. Each grant will provide a stipend for a five year period at the rate of $5000 to $7000 a year depending upon the scholar's qualifications. Candidates from medical schools in the United States and Canada are eligible. Inquiries regarding details of the program should be addressed to Dr. E. J. Huenekens, Medical Director, Sister Elizabeth Kenny Foundation, Inc., 2400 Foshay Tower, Minneapolis 2, Minn.

Cell Changes Set Human Life Span

A new measure of the spontaneous changes in heredity in man, the "somatic mutations" or the variations in the living cells, was presented to the International Genetics Congress in Montreal by Dr. G. Failla of Columbia University's Radiological Research Laboratory, New York.

The measure can be derived from the mortality rate.

Studying mice, rats, fruit flies and men, Dr. Failla found that the spontaneous mutation rate for each per cell per year is very closely the same, if it is assumed that aging is due to somatic mutations.

The increase in mortality rate with advancing age is due primarily to the accumulation of somatic mutations, Dr. Failla suggested, and if this is so the lifespan is set by the inherent stability of the genetic system of the species.

OVR Will Give $1.5 Million in New Research Grants in '59

The Office of Vocational Rehabilitation will put about $1.5 million into new research projects during the 1959 fiscal year and about $3.1 million into the continuation of projects currently under way.

Much of the $1.5 million in "new" money will go into special demonstration projects with particular emphasis upon such serious disabilities as mental illness, mental retardation and cerebral palsy. Funds will also go into special projects in the speech and hearing fields.

OVR will be supporting about 150 projects with its 1959 funds, 100 of them in the "continuation" category.

Taken together, these facts and figures are indicative of a substantial expansion of the OVR research program — an expansion made possible by congressional action which jumped the agency's research fund $1 million above the $3.6 million available in 1958.

Vision Clouds as Cocktails "Make Life Rosy"

The belief that a few cocktails will enable a drinker to "look at the world through rose-colored glasses" is inaccurate. The color is more likely to be grey.

A study of the effect of alcohol on vision and hearing revealed that alcohol had the same effect on vision as that of setting a grey glass in front of the eyes, or driving with sun glasses in twilight or darkness. Stronger light is needed for distinguishing objects and dimly lit objects may not be seen at all, Dr. Rollo N. Harger, professor of biochemistry and toxicology at the Indiana University School of Medicine reports.

Furthermore, alcohol tends to cloud the ability to differentiate between tones.

The difficulty arises because of the depressant effect of alcohol on the central nervous system. Most of the drug effects of alcohol are due to its presence in the brain, which it enters within seconds after it appears in the blood.

Small amounts of alcohol seem to cause a temporary rise in pulse rate, blood pressure, and total blood flow. In addition, the liver's ability to break down sugar becomes impaired. It appears unlikely, however, that the moderate use of alcohol produces any kidney damage.

Medicare Shutdown Early in 1959 Seen as Possibility

Medicare officials, after another look at the account books, see the possibility of a shutdown of the civilian phase of the program early in 1959. The reason is relatively simple: the $72 million appropriated by Congress for the fiscal year will not be adequate. And Senate and House conferees agreed that the armed forces should not spend more than that amount. Maj. Gen. Paul I. Robinson, who retired this week as head of the Office for Dependents Medical Care, says one solution lies in Congress changing its mind and voting more funds after it convenes January 7. Another possibility is for the Defense Department to use other funds to make up its deficit, then explain to Congress next session why its instructions could not be followed. ODMC, in further elaborating on its new restrictions on Medicare use in civilian facilities (brought on by the belt-tightening in Congress), said these surgical procedures would be allowed: (1) bona fide surgical emergencies which cannot be handled on an out-patient basis e.g. perforated ulcer, bowel obstruction, (2) acute surgical conditions in which patient is in clinical need of hospitalization without delay e.g. acute appendicitis, strangulated hernia, pelvic abscess, and (3) injuries of such clinical severity as to require hospitalization but only for treatment of the acute phase. Elective surgery is ruled out, including interval appendectomies, cosmetic surgery, tonsillectomies, routine hysterectomy and uncomplicated hernias.

New Training Programs Supported

The Board of Directors of United Cerebral Palsy Research and Educational Foundation, Inc., has approved the inauguration of three new training programs to be supported by the Foundation. They are:

(a) *Postdoctoral Fellowship Program in Brain Research* — to support investigators-in-training in the broad field of research in the complex problem of neuromuscular disabilities and thus increase the number of investigators qualified to carry on potentially productive studies in these areas and to improve the quality of such research.

(b) *Clinical Fellowship Program* — to interest young physicians, in their residency years, in the problems of diagnosis, clinical management and periodic followup of patients with neuromuscular disabilities; to improve the quality of clinical training in the appropriate medical specialties involved and thus to give better medical service and care to these patients.

(c) *Medical Student Fellowship Program in Cerebral Palsy* — to interest medical students in diagnosis, therapy, rehabilitation and followup of patients with cerebral palsy and/or in participating in some phase of basic or applied research relating to the problems of brain damage.

Inquiries and requests for booklets describing these programs as well as application forms may be procured from Director of Research, United Cerebral Palsy Research and Educational Foundation, 321 W. 44th St., New York 36, N. Y.

A Bony Problem

Radioactive strontium-90, the deadly bone-hugging chemical formed by atomic- and hydrogen-bomb explosions, is virtually "impossible" to remove from the bones of live humans once it has lodged there.

Strontium-90 is one of the most long-lived products of atomic fission, any given amount taking 28 years to be reduced by half. It is a bone-seeker, like calcium and radium.

Fifteen persons with radium in their bodies were studied by scientists from the Atomic Energy Commission's Argonne National Laboratory. They found the "main structural change in human bone containing radium was the plugging of the blood-carrying canals."

Robert E. Rowland reported these results of studies by him and his associates in an account prepared for delivery at the Second United Nations International Conference on the Peaceful Uses of Atomic Energy meeting in Geneva.

The plugging of blood-carrying canals is believed to cause the death of small portions of bone, which must have a continual blood supply to live. Dead bone is usually removed naturally in the course of time. In cases of persons with radium in their bones, however, lifeless bone tended to remain in the body in the 15 cases studied.

Mary Switzer Delivered Principal Address at Hospital Dedication

Miss Mary E. Switzer, Director of the National Office of Vocational Rehabilitation of the Department of Health, Education and Welfare delivered the principal address at the dedication of the National Orthopaedic and Rehabilitation Hospital, Arlington, Va., in October.

The hospital has been designated by Congress as a pilot hospital for rehabilitation of the physically handicapped and as such should attract nation-wide interest. Located in Virginia, it will primarily serve residents of the Washington metropolitan area but it also expects to receive many of the more difficult cases from other parts of the country.

Newly Registered Therapists

August 29, 1958

Stewart, Katherine H., 107 Locust Grove Rd., Rosemont, Pa.
Taylor, Dianne, Mt. Gilead, Ohio

August 30, 1958

Bardsley, Carol, 1711 Park Ave., Minneapolis
Caseldine, Lee E., 1109½ 2nd St., S. W., Rochester, Minn.
Chamless, Sara E., Rt. 1, Ragland, Ala.
Dean, Sue T., 5434 University Blvd., Dallas, Texas
De Santos, Francisca, 1900 Park Ave., Minneapolis
Douglass, Florence E., 1900 Park Ave., Minneapolis
East, Myrna M., 210 N. 7th St., Forsyth, Mont.
Estrada, Geraldine J., 1009 E. 17th St., Minneapolis
Freburg, Stanley I., 1311 S. 9th Ave., Sioux Falls, S. D.
James, Hazel M., 234 10½ St., S. E., Rochester, Minn.
McCandless, Sally Ann, 11421 Whippoorwill, Houston, Texas
Metz, Jane O., c/o Orr, Park View Lane, Wheeling, W. Va.
Myatt, Joan F., 2330 Elda St., Bradbury, Ga.
Niesen, Patricia Ann, 417½ S. W. 3rd St., Rochester, Minn.
Phillips, Betty Ann, 1048 N. Danville St., Arlington, Va.
Ritter, Verle L., 403 E. Washington, Norton, Kans.
Spaulding, Kathleen Ann, Towner, N. D.
Stroy, Dorothy L., 1721 W. 4th St., North Platte, Neb.
Tisher, Ann Louise, 234 10½ St., S.E., Rochester, Minn.
Werner, Lucia D., 3923 Ave. "L," Ft. Madison, Iowa
Westerlund, Donna Joy, 2170 Avondale, Sylvan Lake, Pontiac, Mich.

September 24, 1958

Chatelain, Barbara M., 6234 22nd Rd., N., Arlington, Va.
Von Rump, Betty L., 411 Seekamp, Kirkwood, Mo.

October 2, 1958

Armstrong, Mary Jill, 24 N. Grandview Ave., Dubuque, Iowa
Babcock, Barbara E., 2230 Benderwirt, Rockford, Ill.
Banwell, Robert G., 317 Second Ave., N. E., Clarion, Iowa
Beardsley, James C., 1036 14½ St., Rock Island, Ill.
Bradley, Virginia Ann, Bancroft, Iowa
Coulter, Jesse J., VA Hospital, Lenwood Div., Box 21, Augusta, Ga.
Crowl, Lems C., 1451 E. N. Broadway, Columbus, Ohio
Dahl, Lois May, 4456 N. Lamon, Chicago
Dahm, James P., 620 Elm, Pella, Iowa
Davison, Robert L., 2801 West Ave., Burlington, Iowa
Dontigny, Richard L., St. Francis Hospital, Colorado Springs, Colo.
Duhart, Fred R., 909 Bentley Ave., Orlando, Fla.
Earl, Eleanor F., 1336 Sunnymede Ave., South Bend, Ind.
Ellis, Richard H., Trenton, Neb.
Evans, Martha T., 761 Tionesta Ave., Kane, Pa.
Fyffe, Beverly Ann, 560 Stanton Ave., Springfield, Ohio
Greenwood, Robert R., Rt. No. 8, Lafayette, Ind.
Grodnik, Natalie J., 307 N. Capital, Iowa City
Hanes, Marjean, 845 Somers St., Zanesville, Ohio
Holt, Elaine S., Rt. 1, Marion, Ohio
Irvin, Richard F., 1950 Karbel, Columbus, Ohio
Kimble, Sheila M., 3160 Olentangy River Rd., Columbus, Ohio
Leffler, Thomas F., Jr., 2553 Westbrook Dr., Toledo, Ohio
Oliver, Rolene A., 3632 Solar Vista, Cincinnati
Patton, Nancy J., 163 W. Ninth St., Columbus, Ohio
Penn, William H., 605 S. Third, Broken Bow, Neb.
Piper, Nick J., 600 Ridgewood, Ames, Iowa
Poynter, Joyce A., 400 Monroe, East Liverpool, Ohio
Roshong, Dorothy S., 1334 17th St., N. W., Canton, Ohio
Shoemaker, Lynda Jean, R. No. 4, Delaware, Ohio
Taugher, Brian D., 112 N. Church St., Berlin, Wis.
Terrey, Patricia Ann, 1052 Oakridge, Royal Oak, Mich.
Towne, Peter A., 104½ E. Third St., West Liberty, Iowa
Varouxi, Panayota, West Lawn Dorm., Univ. of Iowa, Iowa City
Weiland, Louis H., R.R. No. 1, Ethan, S. D.
Weydert, Marilyn A., 1315 Curtis St., Dubuque, Iowa
Windsor, Nancy E., 242 Division Ave., Elyria, Ohio

Recent Publications by Members

Harold Lefkoe, "Rapid Rehabilitation Following Industrial Injuries." The Pennsylvania Medical Journal, August, 1958.

O. Leonard Huddleston and co-author, "Applying Facilitation Technics to Self-Care Training." The Physical Therapy Review, September, 1958.

Justus F. Lehmann, "Training of Rehabilitation Personnel." Northwest Medicine, September, 1958.

Ruth N. Miller, "Pelvic Inflammatory Disorders." The Pennsylvania Medical Journal, September, 1958.

Jerome Weiss, "Ion Exchange Resins in Treatment of Diarrhea." The Journal of the Indiana State Medical Association, September, 1958.

Edward P. Reese, "Arthritis — The Use of Physical Therapy as an Aspect of Management." California Medicine, September, 1958.

A. T. Richardson and co-authors, "Systemic Manifestations of Rheumatoid Arthritis and the Pararheumatic Diseases." Annals of Physical Medicine, August, 1958.

Abraham Vinograd, "Physical Medicine in Occlusive Arterial Disease." Delaware State Medical Journal, March, 1958.

Miland E. Knapp, "Physical Rehabilitation as Related to Industrial Compensation." Minnesota Medicine, September, 1958.

Victor Cummings and co-author, "Activation of the Patient with Skeletal Metastatic Neoplasia." The Journal of the American Medical Association, October 4, 1958.

Ernesto Saldias G., "Rehabilitation en Chile." Anales de Rehabilitacion, June, 1958.

O. Leonard Huddleston and co-authors, "The Static Night Splint." The American Journal of Occupational Therapy, September-October, 1958.

Abraham R. Hollender and co-author, "Hearing Loss in Persons of Advanced Age." The Journal of the Florida Medical Association, October, 1958.

Edward W. Lowman, "Rehabilitation of the Rheumatoid Cripple." Arthritis and Rheumatism, February, 1958.

Leo Rosenberg, "The Long-Term Continuing Care Patient." Journal of the Association for Physical and Mental Rehabilitation, July-August, 1958.

Irving S. Cooper and co-authors, "Chemopallidectomy and Chemothalamectomy for Parkinsonism." Geriatrics, March, 1958.

Gustave Gingras, "The Training of Rehabilitation Personnel." Canadian Medical Association Journal, March, 1958.

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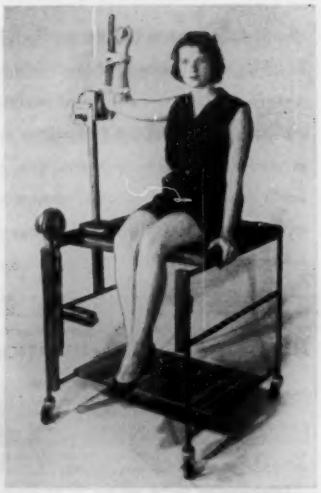

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Apply Personnel Director, Iowa Methodist Hospital, 1200 Pleasant St., Des Moines, Iowa.

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For further information regarding these opportunities, please write Burneice Larson, Medical Bureau, 900 North Michigan, Chicago.

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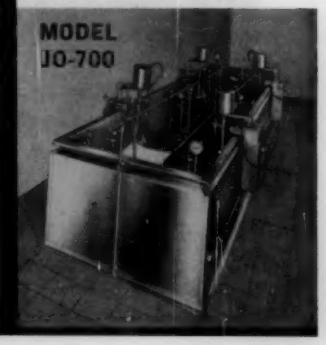

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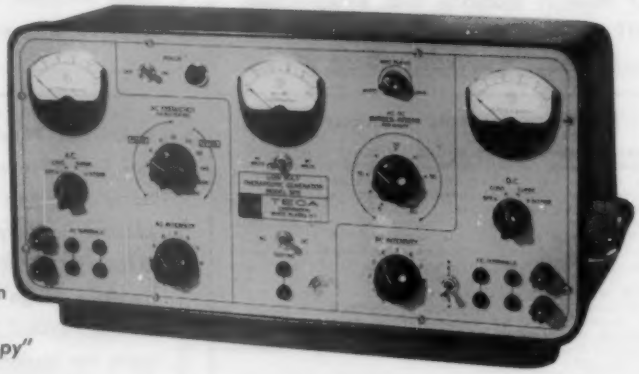

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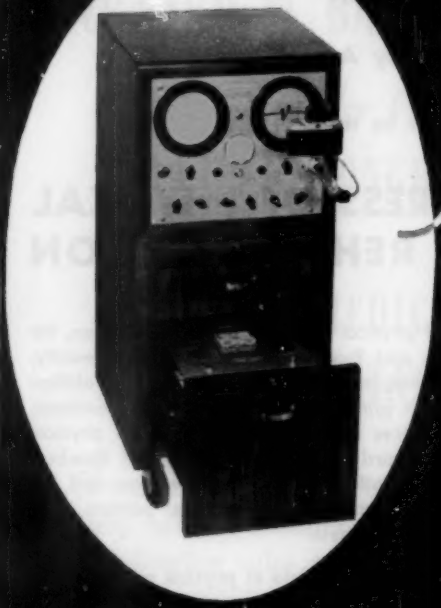

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1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than March 2, 1959.

3. Contributions will be accepted from interns, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of $200.

8. The winner shall be determined by the Essay Award Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Essay Award Committee, no contribution is acceptable. Announcement of the winner will be made at the annual meeting.

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